



**Artur Kocharyan**

Ukraine

## **Conditions of Effective Development of Information and Communication Competencies of Teaching Staff of the University**

### **Abstract**

The article summarizes the results of the pilot study on the implementation of the model of information and communication competencies of the university teaching staff that was conducted at Borys Grinchenko Kyiv University, Ukraine, and describes the basic stages of the research and the conditions of an effective implementation of the model. The article examines ways of improving the quality of higher education in Ukraine in the context of European quality standards for university educational space. The European standards and guidelines are considered in relation to internal quality assurance. The author examines the model of ICT competencies of teaching and research staff and describes structural components of this model: motivational target component, organizational and procedural component, contents and operational and technological component, diagnostic and effective components. The article suggests tools to measure the level of educators' formation in the ICT competence of teaching and research staff. The tools are considered in accordance with the form activities of teaching and research staff. The tools are formed in accordance with the recommendations of UNESCO Standards and Quality Assurance in the European Higher Education Area, namely: understanding and awareness of the role of ICT in education, and basic use of ICT tools.

**Key words:** Quality of higher education; ICT competence; corporate standards; measurement tools

## Introduction

In a situation where all aggressive modern information and communication technologies (ICT) have an impact on the economy of the world, and there are market demands for graduates' new competencies, modern universities have to change and (or) adapt their educational policies in order to prepare competitive professionals who will possess the aforementioned skills. Agents of such changes should be the scientific and teaching staff of the university.

Due to the transformation of education which is happening now in Ukraine, the traditional role of a scientific and pedagogical employee changes. The modern scientific staff member should be able to: select and use ICT for teaching students; organize cooperation and communication between participants in the educational process; design electronic educational resources and electronic environment so as to be a facilitator and an assistant who helps students thoroughly comprehend the material; take into account in the learning process students' needs and characteristics, cognitive learning styles, new services and tools for effective collaboration and communication, and finally have skills of the 21<sup>st</sup> century.

**The purpose of this article** is to generalize the effective implementation of the model we have developed concerning the information and communication competence of the university teaching staff.

## Research Methodology

### Analysis of Recent Research and Publications

Our analysis of psychological and educational literature, and teaching practice showed a growing number of studies, the subject of which was the development of information and communication competence of teachers. In Ukraine, the issues of forming ICT competence and training offered to the teaching staff in the scope of educational use of ICT are discussed by V. Bykov, M. Zhaldak, A. Kolomiets, N. Morze, V. Osadchyi, L. Panchenko, O. Spirin and others.

Analysis of the Standards and Guidelines for Quality Assurance in the European Higher Education noted that the main activities of a teacher in the modern university should focus on creating high quality content and using educational environment, including electronic media. The impact of technology on the occurrence of macro-trends and the reform of higher education in Ukraine supports the hypothesis of an urgent development and implementation of standards of information and communication competence of teachers in terms of European integration processes of modern higher education. The issue of effective information and communication

competence (ICT-competence) of teaching staff is important in terms of improving the quality of education in general and the achievement of European indicators of quality of higher education.

### **General Method of the Study of Information and Communication Competencies of Teaching Staff at the Humanistic Specialty of Traditional Universities**

Theoretical and methodological basis of the study made provision for the organization of educational process in the system of Postgraduate Education in Ukraine and in the context of lifelong learning (Protasova; Klokar; Kremen; Oliinyk), Information Society and Computer oriented environment (Bykov; Hurzhii; Zhaldak; Kukhareenko; Morze; Pietukhova; Spivakovskiy; Lane; Liyoshi; Kumar), Competence approach in training (Morze; Ovcharuk; Smyrnova-Trybulska; Spirin; Khutorskyi), personal-oriented and activity approach to teaching and theory of motivation (Vyhotskyi; Halperin; Elkonin and others).

The aim of our study was to develop a model of ICT competencies of the teaching staff at humanistic specialties of traditional universities. The study was carried out from 2011 to 2015.

During this stage of the experiment (2011–2012), the questionnaire was designed to determine the level of formation of ICT competence of the teaching and research staff; a survey was conducted and levels of ICT competencies of humanities teaching staff were determined using monitoring tools. The aim of this phase of the study was to diagnose the state of formation of the ICT competencies of teaching staff in order to conduct further formative stage of the experiment and test the hypothesis of the study.

During the formative stage of the experiment (2012–2015) a model based on the hypothesis of ICT competencies of humanities teaching staff of a classical university was developed. Experimental work was carried out at the Borys Grinchenko Kyiv University.

## **Research Results**

### **Justification of the Models of Information and Communication Competencies of University Teaching Staff**

Our goal was to create a model of building the organizational and pedagogical conditions of development of ICT competencies of academic teaching staff in terms of e-learning environment.

The proposed model includes several components defined in accordance with the general theory of structure (Kirdyakina, 2010; Kocharyan, 2014; Morze, 2016):

- *motivational target component*, which includes goals and objectives of the educational process;
- *organizational and procedural component*, which defines the principles of the development process of ICT competencies, organizational and pedagogical conditions for this process, influence on learning outcomes;
- *contents and operational and technological component*, which defines the content of learning activities forming the levels of ICT competence specifying organizational forms and methods of infrared competence; and
- *diagnostic and effective components*, which define criteria and performance indicators of ICT competencies of teaching staff, examination and analysis of the effectiveness of the process.

### **Motivational Target Component Model of ICT Competence**

Internal and external reasons mastering ICT have a significant impact on the implementation of the motivational based component development model of ICT competencies of scientific and pedagogical staff. According to the development model, we have developed ICT competence of teaching and research staff. The motivational component of this model consists of foreign and domestic purposes. The external motivation of the staff is to develop their own ICT competence, which is due to the social order of the information society. The internal motivation of the ICT competence of a member of teaching and research staff is to improve their own professional activities.

It should be noted that the development of ICT competence is highly influential and has financial incentives, such as increase in the competitiveness of teaching and research staff on the labor market, career development, upgrading certification, and receiving bonuses, prizes and awards for innovation.

The organizational and procedural component of the educational process from the perspective of system approach is considered by us to be a set of interrelated components inside that maintains the integrity of the development model and allows you to reach the goals. In this component there occurs an indispensable combination of approaches to the implementation of the model, organizational and pedagogical conditions, and factors of influence.

We agree with and have included research results by N. Soroko, L. Chernikova, V. Kheili, L. Velli, who emphasize the fact that during the construction of models of ICT competence there should be considered andragogic principles of adult learning, competitive and personally oriented approach (Hawley, 1999; Vember et al., 2014).

### **Organizational and Procedural Component of the Model of ICT Competence**

Important elements of the organizational and procedural component are educational and methodological support, and scientific and methodological support. In our view, basic organizational and pedagogical conditions that have a decisive

impact on the effectiveness of infrared competence of teaching and research staff are as follows:

- introduction of a system of training and science-based multi-level multi-phased model of ICT competencies of teaching staff;
- differentiation and integration of content, forms and methods of ICT competencies of teaching staff in accordance with its three-tier structure; and
- implementation of continuous scientific and methodological support of ICT competencies of teaching staff based on and using established educational environment (its electronic components).

It should be noted that a variety of causes and factors have a significant impact on the development of ICT competence. Generic names of most principled positions are:

- common features of adult education (focus on the result, the need for justification, independence, etc.);
- professional features of the teaching staff (level of professionalism and professional development stage, professional psychological characteristics); and
- age, individual psychological and gender features.

### **Content, Operational and Technological Components**

This component of the model we have developed defines educational content by means of levels of formation and structural components of the ICT competencies of teaching staff. This component model provided the curriculum, developed and tested by Borys Grinchenko Kyiv University.

The curriculum consists of three levels and begins monitoring the input level of ICT competence formation of scientific and pedagogical staff. After input monitoring and determining the level of ICT competence formation of scientific and pedagogical worker, a training program that is tailored to the certain level of ICT competence starts.

Base level consists of four modules. After the base training program, a member of research staff will be able to:

- create and use in the electronic documents, presentations, graphs, charts, work with databases;
- work with digital photos and audio files;
- search and find relevant information via internet search services; and
- use e-mail.

The advanced level of semantic and operational-technical component of the model of development of ICT competencies of teaching staff consists of three modules. Upon completion of the advanced level of the training program in basic scientific skills, the teaching staff will be able to:

- use Wiki, create their own portfolio using digital photos, audio and video;
- use resources of social network;

- create and maintain their own blog;
- use social geoservices, online storage of documents and files;
- jointly create and edit documents on-line;
- create knowledge maps,
- find, use, create and upload their own podcasts;
- use Internet resources for online communication; and
- use programs to increase productivity, manage a calendar and notes.

The professional level, contextual, operational and technical component of the model of ICT competencies of teaching staff consists of thirteen modules. The result of passing the professional level study program is designing an e-training course on the subject (a module) for teaching and research staff.

### Diagnostic and Effective Components

In our opinion, the monitoring of the basic level of formation of ICT competence should be performed by means of an online survey of the teaching staff. The questionnaire was formed in accordance with the recommendations of UNESCO Standards and Quality Assurance in the European Higher Education Area, namely: understanding and awareness of the role of ICT in education, basic use of ICT tools (Cullen et al., 2003; Morze, 2014; Smyrnova-Trybulska, 2015).

According to the model developed by us, there are following measurement tools of the level of formation of the ICT competence of teaching staff (Table 1).

Table 1.

*Tools to measure the level of educators' formation in the ICT competence of teaching staff*

	Base level	Advanced level	Professional level
	Understanding the role of ICT in education and their use		
Measurement tools	1. Online survey to determine the level of awareness of teachers about the availability of documents on education policy at the University or the State and their role in the activities of the university. 2. Participation in seminars (full-time or remote) on educational policy of the University.	1. Survey of students for use in the profession of innovative educational policy. 2. Survey of teachers in understanding ways to use innovation in the profession of education policy. 3. Survey of students to determine the role of ICT in education and identify students' requests to enrich the e-university environment. 4. Teacher's e-portfolio: availability of data on participation in some group of educational initiatives.	1. E-portfolio: availability of information on participation in the group to create new educational development, a strategy for ICT and their use.

ICT			
Measurement tools	<ol style="list-style-type: none"> <li>1. Tests for independent verification of levels of basic tools (created by the University, IT-Academy).</li> <li>2. Some components of e-learning courses (electronic educational course).</li> </ol>	<ol style="list-style-type: none"> <li>1. Certified electronic educational course, which is a necessary condition for the use of complex ICT tools.</li> <li>2. Teaching materials are based on the use of e-tools.</li> </ol>	<p>Usage of Wiki portal. Own blog of the teacher. Usage of social networks for education. Teacher's e-portfolio.</p>
Educational Activities			
Measurement tools	<ol style="list-style-type: none"> <li>1. Survey of students about the quality of fragmented use of ICT.</li> <li>2. E-testing students' educational achievements.</li> <li>3. Availability of electronic course in LMS Moodle.</li> <li>4. Questioning teachers in understanding the effectiveness the use of ICT in practice.</li> </ol>	<ol style="list-style-type: none"> <li>1. Statistics of usage by students of electronic course, placed on LMS Moodle.</li> <li>2. Links in electronic course on Institutional repository resources.</li> <li>3. Links on open e-resources.</li> <li>4. Links on open learning courses (MOOC).</li> <li>5. E-science publications.</li> <li>6. Survey of students on teacher satisfaction with the proposed e-resources.</li> <li>7. Evaluation of training programs: a list of recommended resources.</li> <li>8. Availability of certified electronic courses on each disciplines that teacher teaches.</li> <li>9. Assessment of systematic use of electronic course resources: reports on e-dean and electronic gradebook of specific electronic course.</li> <li>10. Availability of annotations to certified electronic course on the Wiki portal.</li> <li>11. Assessment of systematic use of resources in the university environment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Creation of an open electronic courses (MOOC) and statistics of their members.</li> <li>2. Organization of email communication and collaboration (including educational projects) in social networks and on the basis of virtual communication (skype, video conferences, webinars, etc.).</li> <li>3. Joint projects on the Wiki portal.</li> <li>4. Teacher's e-portfolio.</li> <li>5. Use of ICT for administration of the educational process.</li> </ol>

Scientific activities			
Measurement tools	1. Survey for teachers' awareness on the use of scientific communication: repositories, scientometric databases, e-libraries, e-journals, as well as opportunities and participation in online conferences. 2. Number of publication in Institutional repository. 3. Citations index in Google Scholar.	Number of international publications. Number of appearances at international conferences.	1. Participation in Intercollegiate and international research projects. 2. Teacher's e-portfolio. 3. Number of joint international publications with scientists from other universities. 4. Citations index in international scientometric databases. 5. Organization and conduct of online conferences, seminars.
Advanced teachers training			
Measurement tools	The certificate of training for ICT.	1. E-portfolio. 2. Participation in distance training courses in Ukraine. 3. List of graduated non-formal learning.	1. E-portfolio. 2. The list of graduated open professional online learning courses (MOOC). 3. Training for colleagues on the use of ICT. 4. Online consultations, conducting webinars out of the experience.

The purposes of the monitoring are the creation of basic level conditions of the formation of ICT competence to be realized by the teaching and research staff in accordance with international standards, and the identification of so-called “weak spots” that they need to learn; after the survey members of the research staff must realize the need for further training to improve their rating and successful professional career.

The monitoring of the advanced level of ICT competence is effected through quality assessment of electronic training courses (ETC), a survey of students and teachers, content and use of institutional repository, and indexing scientific publications, for instance in Google Scholar. The purpose of the online survey is to identify the level of student success and satisfaction from learning with an ETC created by teachers. At the same time the online survey of teachers is performed to identify their level of satisfaction with their professional activities (Morze, 2014; Smyrnova-Trybulska, 2015).

The professional level of formation of ICT competence involves the monitoring of the quality of personal learning environment of a member of teaching and research staff and students with whom he or she works, the effectiveness of ICT in the educational process to implement cooperation, communication, professional development, participation in professional societies and developing life



competencies and skills of the 21<sup>st</sup> century. A comparative assessment of existing international scientometric databases with printed (including electronic) works of teaching and research staff (Web of Science, Scopus, Russian Science Index and others.) (Morze, 2014; Smyrnova-Trybulska, 2015).

## Conclusion

Due to the transformation of education in the new environment and market requirements to prepare competitive specialists, the traditional role of the modern university teaching staff (broadcasting and reproduction of training materials) is replaced by a number of new roles. The modern university teaching staff is able to: select and use electronic resources for student learning; organize cooperation and communication between the participants of the educational process; design electronic resources and electronic educational environment, new services and tools for effective collaboration, communication, and possess the skills of 21<sup>st</sup> century. Therefore, the university teaching staff must meet a certain level of ICT competence.

The model of ICT competencies of teaching and research staff provides the continuity of learning and self-education, based on the exchange of experience through participation in educational networking communities, forums and projects, or distance learning, but also enables the teacher to work on further development of ICT competence. This model of ICT competencies of teaching staff at humanistic specialties of traditional universities can be implemented in the educational system in the development of educational environment of the institution.

This model, in our opinion, can be successfully implemented on the following conditions:

- motivation of teaching staff to develop their ICT competence;
- approved corporate standards of teaching staff at the university, where criteria for the formation of ICT competence were specified; and
- a systematic approach to the implementation of this model.

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## **Warunki efektywnego rozwijania kompetencji informacyjnych i komunikacyjnych kadry dydaktycznej szkoły wyższej**

### Streszczenie

Niniejszy artykuł podsumowuje wyniki pilotażowego badania wdrożenia modelu kompetencji informacyjnych i komunikacyjnych uniwersyteckiej kadry dydaktycznej, które zostało przeprowadzone na Uniwersytecie im. Borysa Grinchenki w Kijowie na Ukrainie, oraz opisuje podstawowe etapy badania i warunki efektywnego wdrożenia modelu. Artykuł relacjonuje sposoby poprawy jakości szkolnictwa wyższego na Ukrainie w kontekście europejskich norm jakości dla przestrzeni szkolnictwa wyższego. Europejskie normy i wytyczne są rozważane w zestawieniu z wewnętrznym systemem zapewniania jakości. Badane są modelowe kompetencje kadry dydaktycznej i naukowej w zakresie ICT (TIK) oraz opisywane są strukturalne elementy tego modelu: element celu motywującego, element organizacyjny i proceduralny, element treści, element operacyjny i element technologiczny, element diagnostyczny i element efektywny. Artykuł proponuje narzędzia służące do pomiaru wykształcania przez pedagogów kompetencji w zakresie ICT (TIK). Narzędzia te uznawane są za zgodne z czynnościami kadry pedagogicznej i badawczej w zakresie tworzenia opisanych kompetencji, ponieważ zostały zbudowane zgodnie z zaleceniami norm i zapewniania jakości UNESCO w obszarze europejskiego szkolnictwa wyższego, mianowicie z zaleceniami dotyczącymi znajomości i świadomości roli ICT (TIK) w kształceniu oraz podstawowym wykorzystywaniu narzędzi ICT (TIK).

**Słowa kluczowe:** jakość szkolnictwa wyższego, kompetencje ICT (TIK), standardy korporacyjne, narzędzia pomiarowe

Artur Kocharyan

### **Условия эффективного развития информационных и коммуникационных компетенций преподавателей университета**

#### **А н н о т а ц и я**

В статье приведены результаты экспериментального исследования по вопросу реализации модели информационно-коммуникационных компетенций преподавательского состава университета, который был проведен в Киевском университете имени Бориса Гринченко, Украина, и описываются основные этапы исследования и условия эффективной реализации модели. В статье рассматриваются пути повышения качества высшего образования в Украине в контексте европейских стандартов качества университетского образования. Европейские стандарты и руководящие принципы рассматриваются в отношении внутреннего контроля качества. Изучается модель ИКТ компетенции педагогов и исследователей, описаны структурные компоненты этой модели: мотивационно-целевой компонент, организационный и процедурный компонент, содержательный, эксплуатационный и технологический компонент, диагностический компонент и компонент эффективности. В статье предлагаются инструменты для измерения уровня ИКТ-компетентности педагогов и исследователей. Инструменты рассматриваются в соответствии с формой деятельности преподавателя и исследователя. Инструменты формируются в соответствии с рекомендациями стандартов ЮНЕСКО по обеспечению качества в Европейском пространстве высшего образования, а именно: понимание и осознание роли ИКТ в образовании, основы использования средств ИКТ.

**К л ю ч е в ы е с л о в а:** качество высшего образования, ИКТ-компетенции, корпоративные стандарты, инструменты измерения

Artur Kocharyan

### **Condiciones del desarrollo efectivo de las competencias informáticas y comunicativas del personal docente en la universidad**

#### **R e s u m e n**

El artículo resume los resultados del estudio experimental llevado a cabo por Borys Grinchenko en la Universidad de Kyiv, Ucrania, que se centra en la ejecución del modelo de competencias informáticas y de la comunicación del personal docente en la universidad. También describe las etapas fundamentales del estudio y las disposiciones de una ejecución eficaz del modelo. El artículo analiza las formas de mejorar la calidad de la educación superior en Ucrania de acuerdo con las normas Europeas de calidad dentro del ámbito educativo de la Universidad.

Las normas y directrices europeas se consideran en relación con la garantía interna de calidad. Dónde se estudia el modelo de competencias docentes TIC en el personal docente e investigador y describe factores estructurales de este modelo: factor con fin motivacional, factor de organización y procedimiento, contenidos y factores tecnológicos y de funcionamiento, factores de diagnóstico y eficacia. El artículo propone medidas para evaluar el nivel de formación en las competencias TIC del personal docente e investigador. Las medidas se tienen en cuenta de acuerdo a las actividades del personal docente e investigador. Las medidas se forman se elaboran de acuerdo con las reco-

mendaciones de la Normativa UNESCO y la Garantía de Calidad en el área de Educación Superior Europea, concretamente: conocer y comprender el papel de las TIC en la educación, y su uso básico.

**P a l a b r a s c l a v e:** Calidad de la educación superior; competencias TIC; normas corporativas; herramientas de medición