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FORMING THE ICT COMPETENCY OF FUTURE PEDAGOGUES UNDER INFORMATIONAL-EDUCATIONAL ENVIRONMENT AT UNIVERSITY

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ABSTRACT

The article views the opportunities of forming the competency in the sphere of informational-communicational technologies (further − ICT competency) of future pedagogues under informational-educational environment at university. The stages of forming the ICT competency are substantiated, as well as tasks and content for each stage, methods and forms used. Special attention is paid to preparing the future pedagogues to organization of the educational process, based on activity approach and use of information-communicational technologies.

When forming the ICT competency of future pedagogues, the great role belongs to the informational-educational environment at university, faculty, department and discipline, where the educational process takes place. The university professors must comprehend the need and efficiency of using modern information and pedagogical technologies in educational process, as well as the specificity of organizational forms of working with electronic educational resources.

As an example of forming the ICT competency of future pedagogues, the article presents the experience of projecting the content of a discipline “Informational technologies in education” for

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Bachelors majoring in “Pedagogical education” and a discipline “Informational technologies in professional activity” for the future Masters of Pedagogy. The content of these disciplines was designed by the authors for the students of Nizhniy Novgorod State Pedagogical University named after Kozma Minin.

Keywords: ICT competency of a pedagogue, informational-educational environment, professional standard of a pedagogue, project activity

1. INTRODUCTION

The social conditions and changes in the sphere of comprehensive and professional pedagogical education require new qualitative results from the graduates of pedagogical universities, which should comply with the needs of modern school. The Federal State Educational Standards of comprehensive education are based on systemic-activity approach, which implies a significant role of dynamic educational-cognitive activity. The objective of modern school is to transfer a student into a mode of self-development. The main criterion of quality education should be its social results − a school graduate should possess the formed attainments and ability to think creatively, find non-standard solutions, take initiative, and work in a team.

Today, as never before, a teacher needs the skills and abilities, related to designing the methods of teaching of various subjects, organization of educational process, and based upon activity approach. This is why one of the indicators of an educator’s being in demand is their ICT competency.

In the recent decades, the issue of the content of ICT competency of pedagogues and its relevance to the issue of forming an informational-educational environment of modern school has been the matter of numerous researches. Of particular interest are the works devoted to determining the requirements to the content of future pedagogues’ higher education. These are the works by T.A. Boronenko (2016), A.V. Ponachugin (Ponachugin and Naumova, 2014), E.K. Samerkhanova (2013), A.N. Sergeev (2015), B.B. Yarmakhov (Yarmakhov and Rozhdestvenskaya, 2015), A.J. Begum (2011) et al.

Today, the notion of the ICT competency of a pedagogue is defined at the level of the Professional Standard of a pedagogue, which stipulates the notion of professional ICT competency. Professional ICT competency is defined as qualified using of informational and

communicational technologies, widely spread in the relevant professional sphere, to solve professional tasks where and when it is needed.

To form the ICT competency of the future pedagogues, the relevant informational-educational environment should be developed at university. The role of informational-educational environment (IEE) in forming the ICT competency of the future pedagogues is discussed in the works by L.N. Bakhtiyarova (Bakhtiyarova and Gruzdeva, 2014), I.G. Zakharova (2013), E.P. Krupoderova (2009), L.K. Raitskaya (2011) and others. The authors highlight that university professors must comprehend the need and efficiency of using modern information and pedagogical technologies in educational process, as well as the specificity of working in informational-educational environment.

In our research, we interpret informational-educational environment as a pedagogical system comprising informational-educational resources; computer teaching aids; means of managing the educational process; pedagogical techniques, methods and technologies aimed at forming the intellectually well-developed, socially significant creative personality possessing the professional competencies at necessary level (Samerkhanova et al., 2016).

To form the ICT competency of the future pedagogues, the informational-educational environment should provide all necessary educational, methodological, scientific, and cognitive information; effective search system and convenient communication should be organized; efficient network interaction should be provided for all participants of the educational process, in which a student's personality is developed.

1.1 PROBLEM FORMULATION

Today, the informational-educational environment of a university is one of the main conditions of improving the quality of education and forming the professional ICT competency of the future pedagogues. The scholars (Starichenko et al., 2014) highlight that the objective of functioning of any informational-educational environment can be defined as complete and operative satisfaction of informational needs of all subjects of educational process in the sphere of management and implementation of all forms and types of educational activity provided for by the university.

In her work, E.P. Krupoderova (2009) notes that the high level of ICT competency would enable the teachers to actively participate in creating the high-tech informational-educational environment of a school, to contribute to its filling and development. With a view of this,

forming of the ICT competency of future pedagogues must be performed in the relevant informational-educational environment of a university.

The informational-educational environment of a university should be generally accessible, reliable, structured, flexible, ready for change, safe, and developmental. Within IEE, all necessary data, organizational and educational-methodological materials should be available; conditions for collective and individual work should be provided. Special attention should be paid to filling of the IEE and to innovative models of using ICT.

It is important to realize that the main feature of a modern informational-educational environment of a university is its openness. The analysis of the Professional Standard of a pedagogue, adopted by the Order of the Russian Ministry of Labor in 2013, showed that one of the requirements to the ICT competency of teachers is such organization of the educational process when the student systematically, in compliance with the educational goals, carry out the activity and achieve results in an open controlled informational environment. The future pedagogues must be prepared for organizing such activity. Hence the requirement of the openness of the informational-educational environment of a university.

Revealing the stages, content, methods and forms of forming the ICT competency of future pedagogues under the informational-educational environment of a university is a topical scientific-practical task.

1.2 LITERATURE REVIEW

There are different interpretations of the notion “ICT competency of a pedagogue”. I.V. Robert interprets ICT competency of a pedagogue as possessing ICT competence. In turn, ICT competence of a teacher is an inseparable integrity, both in the conceptual and activity aspects, of the following scientific-pedagogical spheres: teaching a disciplines with ICT; implementation of informational activity and informational interaction between the participants of educational process, using the potential of the distributed informational resources of the local and global computer networks; expert estimation of psychological-pedagogical, conceptual-methodological value of electronic educational materials; preventing the possible negative consequences of using the ICT means in educational process; automation of informational-methodological provision of the educational process and organizational management of the educational establishment based

on the means of information-communicational technologies, in which a teacher should be well informed. (Robert, 2014).

A.A. Kuznetsov (Kuznetsov et al., 2010) asserts that ICT competency of a teacher is a comprehensive notion, which in the theoretical aspect is viewed as a certain mode of life, and in methodological aspect − includes purposeful effective application of technical knowledge and skills in activity. There are three main aspects of ICT competency: presence of sufficient level of functional literacy in the sphere of ICT; efficient substantiated use of ICT in activity or solving the professional, social and personal tasks; comprehension of ICT as the basis of a new paradigm in education, aimed at developing the students as subjects of informational society, capable of creating knowledge, operating informational arrays to produce a new intellectual and/or activity result.

T.A. Boronenko (2016) proposes to view the ICT competency of a pedagogue as the ability to consciously select information-communicational technologies to acquire subjectively or objectively new scientific-pedagogical knowledge, and readiness to apply these technologies in pedagogical activity and scientific cognition aimed at research and solving practical tasks.

The problem is: “How to define the requirements to the ICT competency of pedagogues so that the rapidly changing situation with education informatization is taken into account?”. In 2011, UNESCO Recommendations were published, which summarize the global experience and approaches to the structure of professional ICT competency of pedagogues (UNESCO, 2011).

The Recommendations state that pedagogues in all countries of the world better realize the advantages rendered by the skillful use of modern information and communicational technologies in educational sphere. However, teachers do not always know how to use the information and communicational technologies effectively.

The structure of ICT competency of teachers and requirements to their training in compliance with the UNESCO Recommendations were thoroughly researched by A.Yu. Uvarov (2013). The Recommendations distinguish three approaches to training teachers for the work in ICT-rich educational environment. The first approach − “Technology Literacy” implies ICT mastering by all citizens through inclusion of the task f technological skills mastering into school curricula. The second approach − “Knowledge Deepening” implies using knowledge for the development of society and economy, and for solving comprehensive practical tasks. The third approach − “Knowledge Creation” is characteristic of the countries directed at building innovative economy,

and transition to knowledge society. The whole school life takes place in the optimal informational-educational environment; ICT are used as the main tool for knowledge production.

The UNESCO Recommendations served as the basis for introducing the notion of the professional ICT competency of a pedagogue, formulated in the Professional Standard of a pedagogue. The Standard stipulates a three-level model of forming the ICT competency of a pedagogue, including: general user's ICT competency; general pedagogical ICT competency; specific pedagogical ICT competency (reflecting the professional ICT competency of the relevant sphere of human activity).

The problem of forming the ICT competency of a pedagogue in the context of the requirements of the Professional Standard of a pedagogue is discussed by O.F. Bryksina (2015), A.N. Seergeev (2015).

1.3 RESEARCH OBJECTIVE

The research objective is to substantiate the tasks, stages, content, methods and forms of forming the ICT competency of a pedagogue under informational-educational environment of a university.

2. RESEARCH METHODS

The methodological basis of the research is:

- theoretical-methodological analysis and synthesis of the available special Russian and foreign scientific-methodological literature; conceptual analysis of scientific articles and publications on the topic;
- study and summarizing of both Russian and foreign research and practical projects on forming the ICT competency of future pedagogues;
- using the methods of generalization, comparison, and prediction.

3. RESULTS AND DISCUSSION

In this research, we interpret ICT competency of a pedagogue as ability and readiness of a pedagogue to organize their professional-pedagogic activity using informational and communicational technologies; to carry out informational interaction between all participants of educational process.

Requirements to the ICT competency of a pedagogue are now stipulated in two documents: the Federal State Educational Standards of comprehensive education at all levels and the Professional Standard of a pedagogue. According to the Federal State Educational Standards of comprehensive education, one of the main meta-discipline results is "forming and developing competence in the sphere of using informational-communicational technologies".

A graduate of comprehensive school should master the modern means of assisting the intellectual (for example, using computer models when solving tasks, etc.), creative (for example, using the tools for creating unique products: websites, infographics, collages, etc.), communicative (for example, selecting a means of network communication adequate to the problem solved and the abilities of subjects involved in solving it, etc.), managerial (in particular, planning, monitoring, analysis of the activity results, etc.) and other types of activity.

Only a teacher with sufficient level of ICT competency can form the ICT competency of a student. Therefore, the future pedagogues need knowledge and skills related to elaboration of the content and methodology of teaching various disciplines, organization of educational-research and extra-curriculum activities of students, basing on appropriate using of ICT.

The authors compared the requirements to the ICT competency of a student (in compliance with the Federal State Educational Standards) and the requirements to the ICT competency of a pedagogue (in compliance with the Professional Standard). This gave the opportunity to substantiate the stages of forming the ICT competency of future pedagogues; the tasks and content of each stage; and to determine the methods and forms of forming the ICT competency.

At the stage of forming the general user's ICT competency, the future pedagogues should form skills of working with modern digital devices (computers, laptops, mobile devices, photo cameras, video cameras, document cameras, printers, multimedia projectors, interactive boards, etc.); of searching and using various informational resources; of networking in informational environment; of providing informational safety. The stage of forming the general-pedagogical ICT competency should be based on solving the professional pedagogical tasks related to using various innovative models of ICT implementation in the lessons. At the stage of forming the discipline-pedagogical ICT competency, the formed knowledge, skills and personal attitudes should be deepened, taking into account the specific features of the subject of professional pedagogical activity using ICT.

Within the universal Bachelor's course offered at Nizhniy Novgorod State Pedagogical University named after Kozma Minin, the forming of the general-user's ICT competency in Bachelors – future pedagogues − takes place, first of all, through the module "Informational technologies". The module is based on the requirements of the Professional Standard of a pedagogue, the Federal State Educational Standards of higher education and the Federal State Educational Standards of comprehensive education. The module consists of the basic and the variation blocks of academic disciplines, which provides the students with opportunity to build their individual educational curriculum in accordance with their interests and abilities. The module is aimed at creating conditions for the student acquiring practical skills of effective using of various information technologies in everyday and professional contexts.

The module "Informational technologies" includes the following disciplines: "Information Science", "Informational and communicative technologies", one of the elective disciplines ("Multimedia technologies", "Internet technologies", "Computer graphics", "Bases of programming", "Global informational resources"). Within the module, the student should form, for example, the skills of using the devices in the sphere of informational and communicative technologies, video- and audio-fixation of the processes in the world around and in the educational processes, search in the Internet and databases. But forming the general-user's ICT competency is not limited to the "Informational technologies" module. One of the most significant features, formed in the junior years of a Bachelor's course of a Pedagogical university, is the ability to effectively work with information presented in different sources: to determine the reliability of the source, to use the effective procedures of obtaining, processing, formalization and representation of information. This feature should be formed within all disciplines. Forming the general-user's ICT competency is continued in the senior years of Bachelor's courses.

Forming the general-pedagogical ICT competency is carried out in parallel with forming the general-professional competences of future pedagogues. As a rule, at the second stage of forming the ICT competency (2−3 years) the disciplines are introduced which position the role of computer technologies in the future professional activity ("Informational technologies in Education", "Informational support of the educational process", "Computer processing of experiment results", etc.). At this stage, the students form the attainment to solve professional tasks using the modern ICT, to participate in building the informational-educational environment of an educational establishment.

At Nizhniy Novgorod State Pedagogical University named after Kozma Minin, Bachelors of Pedagogical Education are offered a course in "Informational technologies in Education" (Bryksina et al., 2016). The content is represented in three sections: "Informational-educational environment", "Informational and communicational technologies in education", and "Project activity in informational-educational environment of the 21st century". The practical assignments within the course are aimed at individual and group work, consisting in analysis of the requirements to the informational-educational environment of a discipline, creating discipline catalogs of digital educational resources, comparative analysis of the traditional and digital tutorials, elaboration of educational situations with informational and communicational technologies. The students participate in the educational project "Teach and study with Web 2.0". An essential aspect is elaboration of own educational products by the students. Such products are: technological maps of educational situations, interactive worksheets, materials for evaluation. The student elaborate them using modern network technologies. An important part of the course is the section "Project activity in informational-educational environment of the 21st century". The students design te portfolio of a project on one of the topics of their future discipline and place it on the wiki-site of the university.

To form the general-pedagogical ICT competency, it is essential to create relevant conditions for the educational process at university, and to use the appropriate methods and forms. Organizing the work under informational-educational environment of the university, the professors should demonstrate using the innovative models of ICT implementation: project technique, BYOD (BringYourOwn Device) model, "flipped learning", etc.

To prepare the future pedagogues to organization of educational processes in the open informational environment, it is essential to use modern network services (Web 2.0 services). The authors' experience of organizing the network project activity of students in the informational-educational environment of a university is presented by Krupoderova (2013) and Samerkhanova et al. (2016).

Formation of the discipline-pedagogical ICT competency of future pedagogues is carried out through all disciplines of professional cycle. The future teachers of Sciences master the techniques of making experiments in virtual laboratories; the future teachers of Mathematics and Economics master the modern tools of computer statistics and visualization, while the future teachers of art – digital technologies of visual arts.

Forming the discipline-pedagogical ICT competency of future pedagogues is continued within the Master's course. It is carried out through discipline "Informational technologies in professional activity", which is included into the basic part of professional cycle of each basic professional educational Master's program of pedagogical education, in accordance with the Federal State Educational Standard of higher education.

An indispensable pedagogical condition of forming the ICT competency of future Bachelors and Masters is the high level of ICT competency of university professors. Enhancing of this level can be carried out through the system of professional qualification advancement, self-education, participation in professional network communities, exchange of experience, participation in seminars, trainings, master classes, webinars, etc.

4. CONCLUSION

We have studied the possibilities of forming the general user's, general pedagogical, and discipline- pedagogical ICT competency of future pedagogues. Analyzing the need for support of forming the ICT competency under the informational-educational environment of a university, one should consider the perpetual process of forming the ICT competency, and its stage-by-stage qualitative increase.

At Nizhniy Novgorod State Pedagogical University named after Kozma Minin, this perpetual process of forming the ICT competency of future pedagogues is carried out when mastering the disciplines of the "Informational technologies" module of a universal Bachelor's course, the discipline "Informational technologies in Education" for the Bachelors majoring in "Pedagogical Education", and the discipline "Informational technologies in professional activity" for the Masters majoring in pedagogical education, as well as within all disciplines of professional cycle.

When forming the ICT competency of future pedagogues, special role is played by the informational-educational environment of a university, where the educational process takes place: availability of the necessary hardware and software, access to informational resources. When preparing students to the future professional activity in the informational-educational environment of a school, pedagogues should use the innovative models of ICT implementation: project technique, BYOD (BringYourOwn Device) model, "flipped learning", etc.

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