CREATION OF THE UNIVERSITY'S INFORMATION AND EDUCATION SPACE AS A CATALYST FOR THE FORMATION OF TEACHERS' IC COMPETENCE

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Abstract: The conceptual basics of the formation of information and education university space are described. The conception of IC competence is clarified, as one of the teacher's key competences. The technology of the realization of content and technological component of the information space are proposed, the features of the formation of the university teacher's IC competence in the conditions of the information society are described.

Keywords: Informatization of higher education, information education space, IC competence, modern ICT in education, informational electronic resources, repositories of opened access, cloud computing.

INTRODUCTION

In the information society information resources and technologies are becoming the most important components of human life activity, which is determined by the global informatization and computerization of human activity in different domains. In the UNESCO worldwide report "To the society of knowledge" it is outlined that "a human will learn, live and work in the environment of distributed instruments, resources and users, to create his own networks of knowledge distribution, to solve the ethical, legal, financial and other problems, connected with the production and the circulation of the information in the network. (To the society of knowledge (UNESCO world wide report)

The main features of the educational system in the information society are the creation of new knowledge, territorial and temporal independence of knowledge acquisition processes, structural and thoughtful updating of the educational process. In this context before the modern education new tasks arise: the informatization of education, which corresponds with the targets of the information society formation,

the distribution of innovative educational practices and the implementation of personalized and competence oriented approaches to teaching, the provision of equal and general access to different informational resources.

The modern destination of the modernization of higher education national system, stipulated by its entering to the global information educational space (IES), requires the experimental approval of the new models of teaching and updates the demand in the forming of information educational space of higher education system. In the frames of national programs of realization in the domain of informatization, in conditions of IES forming of the different levels increases the requirements to the ICT competence of the modern teacher, as one of the key competences.

I.   CONCEPTUAL BASICS OF THE FORMATION OF INFORMATION EDUCATIONAL SPACE

Processes of globalization of education lead to noticeable changes in methodical training systems: aims of teaching are globalized, the content and methods are unified. There appear new forms of teaching technology, which are orientated to the integration of information and communication technologies (ICT) into the teaching process. Especially noticeable changes have occurred within the means of teaching. There has been a transition from the concept "means of teaching" in traditional model of education to the educational environment in activity-orientated pedagogical practice, then to the educational space in the context of personal-orientated, individualized approach, and finally, to the information educational space (IES), which is realized in the process of the development and implementation of ICT (Manako 2011).

IES is determined as a structured complex of the resources and technologies, based on the same standards, which allows provide the interaction of the subjects of educational process within such a space and free access to the informational resources, which are used for the educational tasks solving.

The target of IES formation of the modern university is the "creation of the methodical educational systems, which are orientated for the development of the intellectual potential of the student, formation of skills to get the knowledge independently, to exercise the informational-learning, experimentally-research activity, the different kinds of independent activity for informational data processing (Yaroshenko 2009).

To the main components (objects) of IES will refer:

- *the content component* – the complex of electronic educational resources (EER), which are used (can be used) in the teaching process (teaching, scientific, informational, referential materials, developed in electronic form, presented in electronic media of any type or placed in computer networks, which are used for the organization of efficient educational process, in the segment concerning

its filling with qualitative training-methodology and scientific materials);

- *technological component* – the means of informational interaction, which provide the access to EER with the usage of ICT and including the software-technical means (IT-infrastructure, centralized and decentralized services);

- *organizational component* – organizational structures, structures which provide the formation, functioning and the development of the informational space.

IES is formed and supported by different subjects, which use the different conceptualizations and decision-making strategies. The subjects (participants) of informational interaction in the frames of IES of the modern university are the administration, teaching staff, students, the general public and employers. The main mechanism of IES formation is the interaction of subjects, united by the same understanding of the informational space conception and pedagogical tasks, the single principles and approaches to teaching, i.e. IES is considered to be not only the unification system of the objects of corresponding purpose, but also the domain of general cognitive interests, on the basis of which informational problems are determined, the concrete aims of their solving are set and the ways of these aims reaching are determined.

Informational space can be realized at the levels of educational institutions, regional, national, world one, what lets to speak about different variants of its functioning. At the aspect of system connection between these spaces the strict hierarchy exists, and, consequently, the succession in invariant properties. At this each of IES presents the independent social-informative system with its specifics and features.

IES of the university presents (has to present) the adaptation model of the global and national informative spaces and inherits its most character functional properties, in particular, in communicative aspect IES is presented as the space of common teaching activity on the ICT basis, in integrative aspect it is assumed as the realization of common actions by the way of the installation of the corresponding rules and the adoption of normative documents, i.e. the space can be formed and developed only in accordance with the goals and the tasks of the above mentioned spaces, with taking into account the normative base of informational policy at the international and national levels, the condition and the perspectives of development of the informational interaction means, the features of teaching realization in educational institution, (Bykov 2008), (Yashina 2005), (Izvozchokov 1999). The analysis of science-pedagogical sources has let to distinguish the following features of such space formation:

- IES is the multi-component pedagogical system, including the informational, technological and organizational resources;

- When forming the IES it is necessary to solve the problem of the correlation of the traditional components of educational process and ICT;

- In the informational space the role of teachers IC-competence increases, because

namely the professor (docent, senior lecturer, assistant) decides in which quality, volume and for what purposes could be used IES resources, i.e. the teacher is the one of the most active participants of such space formation.

We will define IC competence of the teacher as the ability of the educator to solve the wide range of pedagogical tasks, to model and construct the educational activity with the usage of ICT, which envisages the sufficient level of functional literacy in ICT domain, effective and reasonable application of ICT for the solving of the professional, social and personal tasks, the understanding of the ICT role as the basis of a new educational paradigm, which is aimed at the student development, as the objects of information society.

The system of IC competence formation has to be orientated not only to the studying of the specific technologies, but also to:

- Formation, through the teacher, of the methodical approach to the choice and the usage in their own professional activity of the ICT for the reaching of pedagogically significant result at the context of the provision of studying material availability, the improving the quality and increasing the efficiency of studying process;

- Formation of the necessary pedagogical abilities and ICT usage skills when teaching the studying subjects in different educational systems;

- The development of abilities and skills of educational process organization with the ICT usage and the management of innovative educational projects;

- Formation of the necessary knowledge and skills in the domain of pedagogical design and the creation of ICT-orientated means of teaching.

For the implementation of innovative ideas into the pedagogical practice it is necessary to provide the effective interaction and collaboration of the scientific chairs of the university and all its structure subdivisions. Exactly in this way the single scientific-methodical space of the university can be created, in which happens the approval of the new innovative teaching models, the theory and practice are combined, the scientific approach is implemented into the educational practice. For the construction of the scientific-methodical system of the faculty staff preparation to the usage of information and communication technologies in the pedagogical activity it is necessary to take into account the necessity of:

- Module structuring of the content, which reflects the technological and didactic abilities of the usage the concrete information and communication technology;

- Changing (expansion) of the teachers role (moderator, facilitator, trainer) in the models of higher education;

- Selection of the technology for the teacher's preparation to its usage in his professional activity;

- Balance and harmonization of the separate content modules of the pedagogical

stuff preparation program in the domain of ICT and distance learning;

- Determination of pedagogical advisability of ICT usage when developing and realizing the pedagogical process;

- Comprehensive analysis of pedagogical solving of the ICT usage questions in higher education system.

II.   CLOUD COMPUTING AS THE INTEGRATION BASIS
OF THE CONTENT FORMATION
AND THE TECHNOLOGICAL COMPONENT
OF THE INFORMATION AND EDUCATION SPACE

A sudden technologies development, the appearance of the new technological platforms and instrumental means change the approaches to the formation of the technological and content component of IES.

In the annual reports of the International Media consortium it is given the list of computer technologies, which will have (or have) the considerable influence for the organization of the educational-training process in the nearest future, namely: mobile technologies and cloud computing (2009), opened content, electronic books, geoservices,   personal web (2010-2011), semantically compatible annexes, Smart-objects, completed reality, (2012-2014), training games, sensor devices and interfaces, data visualization, training analytics (2015-2016) (The Horizon Report: 2009 K-12 Edition, 2009), (The Horizon Report: 2010 K-12 Edition, 2010), (The Horizon Report: 2011 K-12 Edition, 2011).

In UNESCO analytical note "Cloud computing in education" it is indicated, that the " scale effect and other characteristics, inherent to the cloud computing, could become the reason of gradual withdrawal from the placing and providing the informational services in educational institutions. More often these services are provided to the students and teachers via the Internet. Universities get them free or for the low payment, wherein these services are more accessible and reliable then their local analogue (Cloud computing in the education, 2010).

Among the destinations of the cloud computing implementation the software as a service (SaaS) represents the main interest for the modern universities. Let us give the examples of the cloud services, which refer to the given direction: e-mail and office applications (text processor, electronic tables, presentations, etc.), common work instruments, content managing systems, social networks, managing systems by internal and external organisation resources (Cloud Computing Standards Roadmap, 2011).

To the advantages of the cloud computing usage in the domain of education will attribute:

- Facilitation of installation processes, software support and service, which could

be ordered as the internet-service;

-   Flexibility in the usage of different types of the software, which could be compared and researched, owing the fact that there will be no need to buy and install it every time;

-   Possibility of multi-channel replenishment of collections of educational resources and the organization of multiple access to them;

-   Universalization of the processes of distributed teaching owing to virtualization;

-   Possibility of dynamic up-building of the software resources;

-   Mobility of the teaching due to the usage of communication cloud service, such as e-mail, chat, and also the rendering of the disk space for changing and storing the files, which makes the communication and the organization of the common activity more effective.

-   At the same time the transition of the university services to «cloud» contains definite risks, in particular:

-   Constant and reliable access to the Internet network is needed;

-   Organization of the necessary level of data protection and informational security;

-   Some software can function slower then on local computer, in particular it concerns the software providing the graphical data processing.

Thus, the significant feature of the cloud technologies is the perspective of creation of the common infrastructure of the parallel and distributed calculations for the development and the integration of systems, decentralized and centralized services, resources of different types on this basis. Cloud technologies open the way to the development of more completed methods of the multiple access to the electronic resources, and they are the unified methodology of creating teaching platforms, the basis of university IES formation. By the teaching platform it is understood an integrated set of resources, instruments and on-line services for teachers, students and other objects included into the educational process, and intended for the support and enlargement of the possibilities of education obtaining and educational process management. There are distinguished the centralized (education management systems, virtual training environments, systems of teaching content management) educational platforms.

It is obvious that the formation of ICT competence is an important step on the way of the integration of a new technologies into the educational process, but the development of ICT requires a constant perfection of new knowledge, received by teachers, the abilities and skills, it is necessary that the specialist would be ready to use those ICT which will be put in circulation in the nearest future. The training of ICT usage cannot only follow the perfection of the technology, it has to carry the forwarding character, which will allow to reach the following educational purposes:

- To stimulate the usage of modern ICT possibilities for the increasing of teaching efficiency;

- To favor the formation of the experience of the rational distribution of teacher, student and computer in informational educational space ;

- To stimulate the development and the realization of the principles of classes conducting of any type with the usage of all the possibilities of ICT;

- To determine the optimal proportion of the new pedagogical technologies and traditional methods of teaching;

- To promote the realization in the educational process of the personalized orientated approach to teaching.

III.   ORGANIZATION AND MANAGEMENT OF THE CONTENT COMPONENT OF THE INFORMATION SPACE

Increasing the quality of general secondary education is based on the usage of modern EER, providing their accessibility in Internet network. The usage of quality training materials enables students to gain higher education, adequate for modern requirements, not depending on the university's location, it ensures the individualization of educational process, students orientation towards self-education and self-instruction, increasing the level of intensification of the educational process, studying the training material at different levels of complexity and in different volume, the creation of new conditions for possibly the fullest development of the students' general study skills.

The basis of a new conception of training materials construction becomes the objective approach, which foresees the implementation of the principles of fragmentation and discretization of the educational materials and their transfer processes (Telnov 2005), (Zhuge 2004). This conception involves the transition from the development of big rough educational courses to the development of a multitude of educational objects (Reusable Learning Object, RLO), which are used repeatedly, are accessible for the search and the inclusion into concrete educational consecution. Educational materials, developed in such a way, allow the users to search, save, combine them with a view to the formation of a hierarchical structure and share them with other users with ICT support in multiple informational spaces, using the distributed sources, different methods and instruments (Manako , 2004).

The conceptual basis of the formation of educational materials hierarchical structure is the module architecture, i.e. combined content of the subject area is divided for modules, which correspond the topic elements and the components of the educational process. At the same time each module can have an analogue - variation, which differs by the elements of content (educational objects), methodic and realization technology (Electronic educational resources of a new generation, 2011).

When creating the modern EER it is necessary to take into account the international approach for creation and usage of opened educational recourses. (Open Educational Resources, OER) and rendering the open access to them (Budapest initiative "Opened access"), (Susand' Antoni Introduction 2009). Opened educational recourse is determined as educational content, meeting all the requirements of independent and self-dependent education, invariant relative to the categories of audience, placed in opened access and containing all the necessary means for the organization of efficient educational process, based on the dialogue and cooperation. In CapeTown Declaration of the opened education it is noted that «... each person has to have the freedom to use, adapt, perfect and distribute the educational resources. Teachers, and all who share these approaches are united into the world-wide movement of the accessible and effective education (The CapeTown Open Education Declaration).

In the context of creation and usage of the opened educational resources the particular actuality obtain the numerical archives of the teaching objects, which unite the knowledge of the different training disciplines on the basis of the knowledge management systems principles construction. Creation of the numerical archives (repositories) of the educational resources will let provide the flexible formation of teaching-methodological complexes in accordance with different models of specialists competence, to combine the different sources of informational data for different disciplines, to render the access for the participants of educational-pedagogical process in the frames of a single system; to provide the constant development of the system owing to the renovation of the theoretical knowledge and constant accumulation of a new experience, received by the participants of educational-pedagogical process in the frames of this process; to present the relevant to training targets data for each of its participants in accordance with his knowledge, preferences and needs (Morze 2010a, 2010b), (Yaroshenko 2006), (Barton 2004).

Repository system, which unite the knowledge of different scientific disciplines on the basis of construction principles of knowledge management systems, constitute (can represent) the basis of informational educational space of the region secondary education system.

The creation of the repositories will allow to provide the flexible formation of educational and methodological materials in accordance with different models of teaching, to make these educational and methodological materials significantly cheaper and accessible, and the work with them – more convenient and effective, to increase significantly the efficiency of training, by the way of providing the experience and different training materials changeover between the teachers. Among the other advantages is the wide and measurable access of readers, the easiness of the necessary materials search, powerful readers' audience, integration into the global databases, and the new possibilities for the common projects of different types.

With such approach to the organization and management of IES content component the concept of IC-competence determines which skills and abilities the teacher has to possess, namely:

- Access to information data — the ability to find, collect and/or extract information data, using the means and services of Internet network and software for this;

- Informational data management — the ability to apply the existing scheme of the organization or classification, to structure the informational data;

- Critical estimation of informational data – the ability to give a judgment about the quality, importance, utility or the data efficiency, and also about the reliability, scientific character, address direction;

- Creation of information data – the ability to interpret and render the data, to generate the data and the knowledge;

- Changeover of the informational data — the ability to properly transfer the informational data into the IES;

- Thus, the teachers in the frames of such approach have to be able (Structure of teachers ICT-competence, 2012):

- To pick and to use in their work the EER;

- To use the network resources, which let the students to work in collaboration to receive the access to informational data and communicate with external experts during the analysis and the decision of chosen by them problems;

- To develop the numerical educational resources and to construct the educational environment;

- To use the ICT for the collection and processing of professionally–considerable information;

- To realize the informational activity for collection, processing, transferring, and keeping the informational resources.

The construction of the distributive repositories system will let create web-orientated knowledge bases of the actual materials, presented in the different formats, to provide the completeness of their representation, to speed up the process of development, publication, repeated usage and the modernization of educational materials and their distribution on the basis of the flexible electronic technologies. Usage of the training materials which have the similar source of origin but which can vary in different educational regions, not only enlarges the circle of the resources, but also will make the education more attractive for the innovations and investments form the side of IT-industry.

IV.   THE FEATURES OF INFORMATIONAL EDUCATIONAL SPACE TECHNOLOGICAL COMPONENT FORMATION

EER of the new generation, diversification of the training materials, implementation of the innovative pedagogical technologies and of modern ICT means stipulated for the transformation of the approaches for the creation of the IES technological component: from the presentation of the wide spectrum of the inbuilt instruments to the provision of personified training interfaces.

Let us point out that the process of education is realized (can be realized) with the usage of many contexts, sources and technologies – students must have the access to the training materials, resources, Internet services and educational platforms.

The key motives in the development of the new education model are becoming the socio-technological features of the modern ICT: distributed data processing, the development and the perfection of the mobile technologies, general intellectual filtration of the content, 3D-virtualization and manageability. The appearance of Web 2.0 and Web 3.0 services, the technologies of cloud computing, the significant enlargement of the possibilities of the distributed data storage and the perfection of its processing ways is leading to the distribution of decentralized educational platforms, which allows:

- To render to all persons concerned the access to the educational resources at the any stage of the training;

- To help to anybody who wants to share their knowledge to find the students, who would like to study with them;

- To render to anybody interested the possibility of publishing their results and projects.

In the global educational practice Web 2.0 services are considered qualitatively new means of the distribution and accumulation of educational materials, effective instruments of the formation of decentralized educational platform (Patarakin 2007), (Graham 2007), (Blees 2009), (Ivanova 2010), (Schaffert 2008). Wiki, blogs, social networks, sites of stream audio and video, new channels let the users collaborate – to change the information data, to save the links and multimedia documents, to create and edit the content etc. Scientists picked out the following arguments in favor of the decentralized platform implementation: individualization and personification of the educational platform, the quality (there is a possibility that separate elements of centralized educational platforms would not be as good as specialized instruments), the flexibility, the possibility of meeting the pedagogical requirements, updating, and teacher's control.

Pedagogically adjusted and methodically grounded application of these technologies creates the conditions for:

- Common use of the opened, free, network resources;

- Independent creation of network training content (new services significantly simplified the process of materials creation and their placement in the network, thanking for this each one can not only to receive the access to the numerical collections, but to form its own);

- Productive common activity (participation in professional communities distance learning, common projects).

The analysis of the publications has revealed, that for the realization of the technological component of IES can different combinations of Web 2.0 and Web 3.0 services be used, which opens before the pedagogical practice the following possibilities:

- Openness and general access to the informational content of the electronic resources. As the result of the common activity of the users it is collected the huge quantity of the training materials, which are accessible to the all users ;

- The process of creation and publication of the training material in the network is accessible to all the users. Each of them has not only the access to teaching numeric collection, but also can independently form his own network content: texts, pictures, photos, audio and video files, didactical materials, etc.;

- Experience changeover. The usage of Internet network through the social services opens the new possibilities of the common activity and further collaboration with colleagues.

The implementation of the decentralized educational platforms requires the expansion of the knowledge, skills, and abilities of the teachers in the domain of possessing the communicative technologies abs social services. At this it is important not only to form the conception about the instruments of social services Web 2.0 and Web 3.0, their destination and structure, but also to get them acquainted with the possibilities of their usage in the educational process, principles of classes conducting with its usage, the usage of Web 2.0 services for teaching in the specific subject domain. With such approach the work of teachers is becoming one of the serious didactic instruments of their IC-competence formation.

In IES the important role is played by the communities into which in the frames of common activity subjects are united. With the help of the Internet and social services are interconnected not only the computers and the documents, but also people, who use these computers, documents and services. The basis of the networks community is constituted by the easy interactions of the participants, messages changeover, social services, which represent the network software, (first of all these are modern assets Web 2.0) for the support of group interaction (Patarakin 2007).

Considering the process of the teaching form the position of virtual communities' creation, it is possible to mark out the following features:

- Training and teaching cannot be totally controlled by the individual - the external support is needed that lets the students ascend the higher level of

material familiarization and new knowledge production;

- Training and teaching are always the process where the ability to install the connections between the knowledge branches, conceptions, ideas is the key one, and the available knowledge is more important;

- Training is the constant process of decision making;

- Training is taking place in the community of messages changeover where the beginners gradually are becoming the experts through the active practical activity;

- Training is taking place as the process of network formation in accordance with the theory of connectionism.

For the professional usage of the social networks instruments the teacher has to possess formed conceptions about the sense of network interaction in the professional development of the teacher, existing professional teachers' communities and social networks, electronic educational resources and the possibilities of their usage in professional activity and others, which assists the development of their IC-competence.

Today in educational practice the processes of formation of the decentralized educational platforms haven't yet received the wide expansion, whereas the network interaction in professional and social domains is the usual event. By the opinion of the authors, the modern network technologies are the basis for the formation of the technological component of IES and the organization of educational communities. The implementation of the decentralized educational platform of training process organization in educational institutions will let provide the support of students in raising of their own educational targets, in management of the educational materials and their own educational process, in the communication with other participants of the educational process.

CONCLUSION

One of the prospective ways of the perfection of the information support of the educational process in the higher education system is the forming of IES. It allows for creating conditions for supporting the learner's self-development at the most, providing the processes of humanization of education and increasing its creativity, favouring culture formed naturally, which is generated by the informational epoch, are realized the interests and needs of the individual and social groups.

IES has to be built as a system, by its essence comprising the unity of functionally and structurally interconnected informational and technological elements, skilled usage of which in pedagogical practice will let the teacher in the conditions of education informatization solve the didactic issues on the technological basis with the quality guaranteed.

The usage in the educational process of the IES resources is aimed at the intensification of the training process, perfection of the forms and methods of training process organization, which provides the transition from the mechanical learning by students of evident knowledge to their acquiring of abilities to gain new knowledge independently.

Efficient usage of the wide spectrum of IES resources is connected today with the formation of the IC-competence as the most important component of the key competence of the educational process participants. The issue of the preparation of the pedagogical staff for higher school, who possess the necessary level of the IC competence has arisen at all the levels of the state system of the pedagogical education (pre-university preparation, preparation in university, after-university preparation).

IC competence of the pedagogical staff has to provide the realization of the new educational targets and the new content of educational activity, the implementation of the new forms of educational process organization. At that the necessary conditions of teachers IC-competence forming and development are:

- The readiness of the teacher to the constant self-education and increasing the qualification in ICT domain;

- The teachers being preparedto the decision of the problems of the educational process efficiency increasing on the basis of modern ICT;

- Constant enlargement of the ICT possibilities usage spectrum in educational process and professional activity;

- Informational-methodological provision of the educational process in the domain of ICT usage, which would let the teachers of the different branches of science realize the principle of poly-functionality;

- Constant support and consulting over the questions of IES resources usage.

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