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# Electronic Informational and Educational Environment as a Factor of Competence-Oriented Higher Pedagogical Education in the Sphere of Health, Safety and Environment

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**ABSTRACT**

The authors consider the question of computerisation in health, safety and environment teachers' training in the context of the general approaches and requirements of the Federal National Standard of Higher Education, which is realised through designing of electronic informational and educational environment. The researchers argue indispensability of the last in the process of forming informational competences, and suggest mechanisms of its realisations. The applied methods of theoretical analysis and synthesis of ideas and approaches to the stated question helped to distinguish the theoretical fundamentals of electronic informational and educational environment modelling, to demonstrate the role of electronic learning and methodological complex (ELMC) in raising the efficiency of competence-oriented higher pedagogical education in health, safety and environment within electronic informational and educational environment, the levels of formedness of student informational competences are defined.

**KEYWORDS**
Electronic informational and educational environment, competences, postnonclassicality, electronic learning and methodological complex, interactivity

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## Introduction

The modern epoch is forming for the human being a new informational environment, specific in his cultural development, entirely different from the one in which the most part of the natural history has passed. In the conditions of a very rapid improvement of information, the strength and diversity in informational channels, a new informational interaction, leading to an essential transformation in human performances and further progress in general civilisational development, is developing (Akbashev, 2007; Kolesnikova, 2007).

Application of the global information networks, providing wide communication, determines a new form of social relations, which are based on the need of people "to think and act together". This new phenomenon in the interpretation of

N. N. Moiseev (2003) is called “Collective Intellect” that presupposes uniting all people with informational connections, due to which people can reach a common knowledge, common understanding of a situation, common concern over personal safety, a country, the mankind in general, environment protection. As a result, a common vision of the urgency and dramatic character of natural, ecological, industrial and social hazards as the basis for universal decisions and measurements elaboration is inevitably emerging. An example to this is the fact of creation of the Concept of Sustainable Development, the main provisions of which are aimed at achieving co-evolutional society and nature development. Solution of such a complicated and immense problem calls for addressing to the vast culturological basics of safety with the respect to the information resource, presupposing the progressive advancement of civilisation; for intensification of interdisciplinary communication, based on the awareness-raising and communicative processes.

The main competitive advantage of the highly developed countries is associated with the development of its human capital, which is largely determined by the state education system. It is in this is a source of economic growth in the medium and long term. Today, education is an essential tool and resource for becoming a creative person, able and ready to live in a multicultural society, to take responsible decisions in terms of free choice, to the dialogue as a consciously adopted the form of cooperation and competition.

With the advent of ICT in education is actualized the problem of training teachers to work in conditions to, the success of which depends largely on decisions not only the result of training, but also to achieve the necessary level of personal development of the student. Modern teacher must be competent in the implementation of applied aspects of the use of information and communication technologies in their professional activities.

In the educational segment of the Internet network an increasing number of educational communities, which indicates the increasing interest of teachers to network communication technology and distance teaching.

The projection of social changes in the educational system was reflected in the wide-range computerisation of the higher competence-oriented training of a teacher in Health, Safety and Environment.

## Methodological Framework

The authors focus on the training of Health, Safety and Environment teachers, orienting themselves in the sphere of information resources and communication technologies, and possessing the ability to organise the educational process at school in Health, Safety and Environment, based on the computer-oriented approach. The problem of pedagogical education computerisation in the sphere of Health, Safety and Environment presupposes solving of some principle tasks, connected, according to I. V. Robert (2010), to the transfer-integrative domain of the new scientific knowledge in the framework of the traditional disciplines, the development of which is determined by computerisation of education. Enrichment of the pedagogical education in Health, Safety and Environment with scientific computerisation ideas and a practical set of instruments in information and communication technology

promotes the formation of integrative transfer-zones, providing a modern teacher with common cultural, common professional and specific professional competences.

In a study (Ghergulescu and Muntean, 2016) formulated group activities "Internet distance education teacher," which are general in nature and are relevant, including for full-time teacher:

1. Activities related general cultural and civilizational standards of the relevant professional level.

2. Activities related to the decision of the moral and philosophical problems, national, cultural and religious identity and personal identity.

3. Activities, dictated by the requirements of the profession, specialty.

The paper (Sotiriou *et al.*, 2016) reveals the essence of the major functional components of pedagogical activity of distance education teacher (function design process of training, support and development of students, management, control and diagnostic, information and informative, motivational, organizational-activity, consulting, communicative, reflexive) that from the point of view of individually oriented, context and activity approaches are grouped into the following key:

1) organizational;

2) information;

3) communicative;

4) develop.

A number of scientists (Zanjani *et al.*, 2016) believes that the success of the tutor's activities depends on a number of conditions. Based on the analysis of the specific activities of a tutor, the requirements for it, the problems that may face tutor, the author has identified three groups of conditions to ensure success of the tutor:

– teaching - they are connected with the taking into account psychological and pedagogical principles of distance education and the organization of educational process, and using a variety of appropriate learning objectives at this stage of pedagogical techniques (e.g., encourage participation, involvement of experts), providing interactivity throughout the learning process;

– organizational and communication - just as they imply knowledge of the psychology of communication, the rules of etiquette, ways to increase motivation and involvement of students in the learning process, choosing the right style of leadership and communication;

– technical - include provision of access to computer means of communication (as the tutor and the students), "computer literacy" Participants of distance education process.

A number of scientists (Koichu *et al.*, 2016) examines the tutor counselor by teachers conducting training and methodological support of students during the learning process in distance education. Accompanying tutor students in distance

education takes place through consultation, conducting tutorials (where in the complex decision held teaching and professional problems, there is disclosure of the potential trainees), the organization of self-help groups, providing feedback, the organization / maintenance of communications.

Also in the work (Gay, 2016) considered that the tutor in distance education system must perform the following activities:

– be able to construct the educational process on the basis of information and communication technologies;

- have the skills to conduct classes in an interactive way, using effective teaching techniques;

- be able to organize scientific and methodological expertise of educational resources;

- have the skills of teachers to meet the operational needs of the educational, informational, analytical, scientific, methodological and technological nature.

In a study (Wainberg *et al.*, 2016) has developed a technology organization of creative activity of students in distance learning, in which isolated individual blocks of qualities and skills required of the teacher-coordinator of distance education activities: organizational, pedagogical, reflective and analytical, projective, information, communication, technical and practical, personal.

A review of research activities of teachers at work in distance education system has shown a large number of variations of the language and approaches to the description of activity of the teacher, in connection with what is required to lead them to unity, since activities can be the basis for the development of qualification requirements for teachers in distance education that it is necessary to improve the quality of its training.

## Results and Discussions

### *Designing of electronic informational and educational environment in higher pedagogical education in the sphere of Health, Safety and Environment*

A necessary factor for pedagogical education at a higher educational institution is designing an electronic informational and educational environment that will allow to fundamentally update the technological basis of education, to establish a way to an open educational system that can meet the challenges of the modern society (Davydov, 2004; Ursul, 2007; McNeil, 2003). In the works of E. O. Ivanova (2011), I. M. Osmolovskaya (2011), V. I. Soldatkin (2002), informational and educational environment is considered as a systemic body of informational, technical, learning and methodological support, inseparably connected to the human being as the subject of education (Ivanova, 2011; Soldatkin, 2002), as a system of contacting means with knowledge, which serves storing, structuring and information provision purposes, comprising the context of the accumulated knowledge as an integration, created by the subjects of educational process: information on traditional and electronic media; information and communication

technologies (ICT), including virtual libraries, distributed databases; didactical and methodological complexes (Soldatkin, 2002).

An informational and educational environment, created at a teachers training university, is an indicator of the university's "inner life" quality characteristic, defined by the strategic aims of higher education and formation of a graduate with a high level of informational competence. One of the notions of the concept of informational environment means that informational environment not just as a medium of information, but, what is ultimately important, an active source, influencing its participants as well.

Electronic informational and educational environment in higher pedagogical education in the sphere of Health, Safety and Environment, being an integral part of the higher institution's environment, includes two interrelated subsystems: scientific and informational – an integrative sphere of "safe wellbeing" and scientific and methodological – the theory and methodology of Health, Safety and Environment teaching. Its conceptual grounds were developed in the general theoretic logics of the environmental approach. The importance of the educational environment phenomenon as a factor for personal and professional development, a form of socialisation and social and professional adaptation, a means of successful realisation of the competence approach is underlined in the works of V. A. Kozyrev (1999), N. B. Krylova (2000), V. I. Slobodchikov (2002), A. V. Khutorskoi (2005), V. A. Yasvin (2001). The researches draw our attention to the fact that separate fragments of the environment, selected by the human consciousness, are naturally interconnected, and, penetrating each other, create a unified educational environment of every single subject of education. Educational environment as "being-in-the-world" is predetermined by historical and cultural experience that includes systems of values, knowledge, activity methods, traditional beliefs, innovations, various cultural texts that influence the development of a Health, Safety and Environment teacher's personal and professional competence. The learning person is identifying oneself with the environmental images, transfers them into the intrapsychic sphere, "where they transform into some unites of the person's spiritual world" (Zapesotskii, 2006). Saturating the environment with new meanings, information, ICT-activity and interaction broaden its developmental potential. Although recognising the influence of informational and educational environment in improvement of a highly-competent personality, we, alongside with some researchers (Krylova, 2000; Slobodchikov, 2002), don't consider this influence one-directional. The learning person, being a subject of educational activity, changes the environment, while changing oneself. The human consciousness, immersed into the learning field, becomes an important environment-forming factor.

The situation with the advent of distance teaching was exactly the opposite. remote teacher began to appear since the late 90-ies of the XX century (in schools) who have experimented with remote lessons. In parallel, a few universities that implement basically the international cooperation program, also began to appear remote teachers (or tutors), who held classes with the help of rather poor at the time of network tools (chat, forum, e-mail). At first, no one taught the teachers of remote procedure, everything was done through self-education. Later (. Around 2002-03) began to appear on the subject of computer courses of distance education, but they were mainly of a technical nature - students mastered a specific software. Each educational institution has decided the issue of employment of its remote employees themselves. This situation created difficulties with the understanding of rights and

responsibilities of teachers in the system of distance education, "legality" of their work in the organization (in the situation of their physical absence from the classroom during their remote). Therefore, long-brewing issue "legitimize" the teacher activity in the system of distance education. But the introduction of a new post in the staffing and even job descriptions of distance education teachers question was not, as in the Common qualifying directory (CEN) positions of managers, specialists and employees in the part "qualification characteristics of workers of education" no qualification requirements for teachers working remotely.

In addition, the question remains open of requirements for knowledge of the teacher at work in the system of distance education, to levels of development, which significantly impairs the development of distance education in educational institutions, and to this day. Because until now there was no (reporting and analysis) and information materials; preparation and issuance of certificates (certificates, diplomas, etc.); Tracking the presence of students in the webinars in accordance with the schedule of activities the group; Check remote listeners in the LMS (Learning management system - Learning Management System), professional communities, forums, etc.; the collection of information (feedback) from the remote trainees; Consultancy remote trainees on technical matters of the educational process; collaboration with teachers, psychologists, parents or persons substituting them);

– psycho-pedagogical activity is regulation of educational activity of students in distance education (management of communicative activity of students, respect netiquette; cooperation with the course developer, curator, psychologist, parents or persons substituting them);

– teaching activity is remote training sessions with students, monitoring and evaluation of teaching and research activities of students with the use of electronic forms of documents;

– research activity is the study of the process and distance learning results of students, taking into account the development of knowledge, the mastery of skills, application of acquired skills, the development of creative activity experience, cognitive interest; self-teaching activities; participation in conferences, workshops, educational online communities on the subject of e-learning, distance learning technologies; presentation and publication of articles, publications; research in the field prior to the study; develop proposals to update the approaches to teaching and teaching techniques).

The study found a wide range of activity of the teacher in the system to which part of the functions (methodical development of distance learning courses, the organization of solutions to technical problems, etc.) can be transferred to the assistants, so that there was a need to separate the functions between the participants of the educational process, leaving only the remote teaching the subject for a teacher, freeing the teacher from the secondary functions.

Thus, at the beginning of the study was studied teacher activity in the system of distance education, carried out surveillance and survey by participants of experimental sites FGAU "FIRO" on the subject of implementation of distance learning, with the result that was presented to the systematization of the problems solved teacher, and identified the main types of activity of the teacher in system to which were redundant and require additional separations. Not formulated qualification requirements for teachers to work in the system of distance education, for PC institutions that train teachers to work in the system of distance education,

there is no guidance, what should be taught the teacher. Therefore, some universities teach purely technical skills with a specific learning system, the other one is communication skills on the Internet, while others - the method of remote teaching.

Based on the analysis of problems solved by the teacher formulated views of the teacher activities in distance education system as a collection of different forms of organizational activity, which can be combined according to the following criteria:

 methodical activity - development of methods of remote learning process (development of working programs, models and remote course structure, the development of theoretical, practical and control and assessment materials a distance course based on their variability, analysis and evaluation of the quality of scientific-methodical and educational materials distance learning, development of distance learning models for the development of the subject taught, the course subjects (modules) of the educational program; adaptation of theoretical, practical and reference materials to the level of a distance course trainees);

 the organizational and administrative activity - organization of distance learning process within the framework of the subject of teaching and extracurricular activities (development of organizational and administrative records distance course, the formation of study groups; conducting training and planning documentation in paper and electronic media; Consultancy distance learning on organizational matters of the educational process; creation of reporting headings.

In designing of electronic informational and educational environment in the sphere of Health, Safety and Environment teaching, there distinguishes a range of fundamental methodological grounds: ideas and principles.

The idea of computerisation as a factor for passing to noosphere and Stable Social and Natural Development. According to V. I. Vernadskii (1989), improvement of the organisational level, the level of biosphere complexity in the course of its transformation into noosphere is fulfilled due to increase in information volume. It is believed that the general matter of evolution "demonstrates itself in a purposeful accumulation of information and in growth of its application."

The idea of postnonclassicality (Stepin, 2009), is related to formation of the contemporary scientific world view, reflecting the problematic projectivity of the life activity; behavioural strategies, related to the cultural mastering of the changeable and potentially dangerous world; complex personal positioning (me and my planet; me and my country; me and my city (town)). In this idea the role of a human in safe and stable world preservation is emphasised, as well as the role of an individual's responsibility for personal, national, global safety; effective assistance, personal culture of a safe behavioural pattern.

The idea of cultural communication (Rozin, 2007) is based on the principle of universal interconnection of phenomena: cohesion of the worlds of nature and humans, nature and society stable development, unity of natural, industrial, ecological and social safety on different levels of their spatial organisation.

Formation of electronic informational and educational environment in training future Health, Safety and Environment teachers at Kozma Minin Nizhny Novgorod State Pedagogical University was fulfilled in accordance with the following principles: axiologiness, emotional, informational and functional enrichment, and business comfortability of the electronic informational and educational

environment, fundamentalization, variability, context principle, reflection, communicativeness, inter-subject productive cooperation.

In scientific and methodological literature, the peculiarities of informational and educational environment are widely discussed (Kozyrev, 1999; Kolesnikova, 2007; Leontyeva, 2009; Soldatkin, 2002; Subbotin, 1994). We have presented grounds for the following ones: integrity, interactivity, variability, openness, subjectivity, polyfunctionality, abundance in informational saturation, evolutionism, dynamism, functional comfort, emotional tensity (Kamerilova, 2015; Kamerilova, 2012; Kartavykh, 2015).

### *Electronic learning and methodological complex (ELMC) of disciplines in training of Health, Safety and Environment teachers as the basis of informational and educational environment*

Development of ELMC disciplines in scientific and informational, and scientific and methodological training in the sphere of Health, Safety and Environment was based on the developed classical ideas and innovations in the domain of training package and informational and methodological support of computerisation in education (Panevina, 2011; Tumalev, 2003). According to the contemporary understanding, ELMC is a structured complex of electronic educational recourses, containing an interrelated educational content and aimed at their combined application in the process of education.

We consider the ELMC disciplines, created by us, as a pedagogical project that was developed in the informational and educational environment of Minin University, based on the stated above basic theoretical and methodological ideas and principles; the project represents a generalised scenario of educational process in cohesion of its objective, content-related, procedural, technological, effectiveness-evaluating components.

ELMC formatting in Health, Safety and Environment was realised through the modular approach (Yutsyavichene, 1989), which presupposes systemisation of teaching materials into interconnected modules – blocks in accordance with developing competences. Every module represents a complete cycle of cognitive activity, including learning content, the means of learning and diagnostics of educational results. Due to this approach, integrity and completeness, plenitude and logicality in designing of teaching materials and the process of learning them in the domain of informational and educational environment. The required variability is fulfilled through reorganisation of the content in multi-branched modular programmes and freedom in selecting a particular learning route, the point rating system of educational progress evaluation is realised. A module as a complete cognitive cycle includes the following blocks: 1) motivational and objective; 2) awareness-raising; 3) methodological; 4) performance-related; 5) control-related.

Based on the research of I. V. Robert (2010), we have analysed the diagnostics of the level of informational competences acquirement. A low level corresponds to the adaptive stage in informational resources and ICT usage, where reproductive methods and techniques of searching information in search engines are dominating. A medium level corresponds to the informational and operational stage, where the usage range of interactive dialog and ICT means is broadening, aiming at acquiring an educational product through partially

searching methods. A high level corresponds to the creative and practical stage with complex navigation and imitation modelling application; with the help of ICT, various project designing and research work is fulfilled.

## Conclusions

As a result of the fulfilled research, the topicality of computerisation in higher pedagogical training system in Health, Safety and Environment, which is realised through designing of electronic informational and educational environment, is demonstrated. Electronic informational and educational environment provides radical changes and fundamental modernisation of higher pedagogical education in the sphere of Health, Safety and Environment, aimed at formation of informational competences of a contemporary teacher.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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