EDUCATIONAL AND METHODICAL SUPPLYING OF THE COURSE OF SAFETY ACTIVITY ON BASIS OF INFORMATIONAL COMMUNICATION TECHNOLOGIES

V.P. Demkin, G.V. Mozhaeva, A.V. Trukhin, A.A. Sedler, A.V. Starchenko
Tomsk State University, Tomsk

The article considers the particularity of the course of safety activity in extreme and emergency situations and its educational and methical supplying. There are some worked out educational guidance complexes used for the course learning based on applying of computer trainer and teaching systems.

Origin of the situations, that threaten mankind, became one of the inalienable features of our epoch. Natural disasters, states of emergency, threat of terrorism and others expose to constant danger for people of all continents require a serious preparation for such situations. Many countries in the world pursue a policy directed not only at aiding population that were injured by natural or anthropogenic disaster but also at prevention of possible state of emergency. Such actions are realized according to geopolitical, strategical, socio-economic and other factors. They are directed at decreasing of disaster origin risks and at decreasing of possible destructive consequences scale.

One of important activity direction at prevention of states of emergency and crisis situations and safeguarding of personal and social safety in such situation in Russian Federation is special courses. These courses are directed at safety activity (SA), including states of emergency and crisis situations (SE and CS) in educational institutions of Russia.

SA course studying has its own specifics that are connected with material characteristic and necessity of students practice oriented training within the framework of the course. Special demands are set up to safety activity in emergency and crisis situations.

Educational and methical supplying of the safety activity course has to contain not only theoretical material, but also computer trainer complex and models for states of emergency evaluation and decision making and for behavior manners working out for states of emergency as a result of natural calamity and production activity of mankind. Comprehensive approach educational and methical supplying will enable to use the possibilities of multimedia technologies with maximal effectiveness for deep material learning by students and for possible emergency situations and their consequences visualization and modeling.

This specific was taken into consideration while carrying out the project "Methodology of qualitative educational system improvement and studying youth, heads and specialists of educational institutions and authority of education on providing safety activity in states of emergency and crisis situations upbringing". This project is realized within the framework of the analytic departmental and special-purpose program "Science potential of higher school development (2006-2008 years)" of Ministry of Education and Science in Russian Federation.

One of fundamental problems of the project is new educational and methical supplying of the course of safety activity in institutes of higher education. This course includes two network educational and methical complexes: automated trainer and teaching system and emergency situations development modeling, its evaluating and decisions making.

In 2006-2007 two educational and methical complexes (EMC) were developed by project participants – "Safety activity" and "Defense in states of emergency". Their network versions are included in automated support and educational process management system "Electronic University" of Tomsk State University that was designed in Institute of Distant Education of TSU: http://edu.tsu.ru. EMC is addressed to students of institutes of higher education and are meant for safety activity course studying not only in base institutes but also in branches with distant educational technologies using within the framework of the program of academic exchange etc.

The both complexes are adapted by authors (V.I.Golikov, PhD, I.L.Nadtochiy, assistant professor) to distant education system and suppose a possibility of using such contemporary informational and communication technologies as videoconferencing, IP-broadcasting and TV broadcasting etc. in educational process.

Each EMC is a complex of logically connected structured didactical units and makes possible the comprehensive approach to base didactical problems solving and organizing theoretical material learning, practical tasks, controlling events, consultative and methodical support for distant education [2].

Using EMC in the lessons helps teachers to realize principles of differentiated and individual approach to teaching, to raise a motivation level of educational activity. Using such approach each student is permitted to choose own material learning trajectory, to address again to learning textbook or to work through initial skills of behavior in states of emergency with the help of computer trainer. EMC makes actual a student independent creative activity, creates conditions for personality and professional growth, improves visual demonstration and emotionality level of attention a capacity of work. Using contemporary information technologies in educational process enable students to form analytic, prognostic, projective and developing competence.

Educational and methodical complex "Safety activity" familiarizes students with basic educational material of the course, with juridical, normative-technical, organizational and theoretical basis of safety activity and also with consequences of dangerous factors influence over a person in the states of emergency, with possible ways and methods of technical and technological means safety improving, with forecast methods of emergency situations and their consequences, with civil defense organization issues.

The second UMC is "Defense in states of emergency". It's based on existing normative statements analyze that determines different people actions in emergency situations and displays the public policy in SE and CS people protection sphere.

Primary intention of designed methodical complexes consists of: guaranteed implementation of normative legal statements of training people in safety activity sphere; formation of specialists' outlooks, skills and habits for personal, society and national safety from different dangerous factors and sources of danger; development of united trainer system to train specialists of educational institutions in civil defense sphere and protection from social, natural or anthropogenic emergency and crisis situations.

Each EMC includes course working program, network tutorial, glossary, guidelines for students and test program [3].

Course working program contains goals and objectives of course studying, students' activity essence. There are content of program with detailed description of all studied chapters, educational and subject plan, list of basic and additional literature that is recommended for self-education.

Material of tutorials is interconnected hypertext with multimedia applications that provides information of different levels depending on solving didactical tasks.

Definitions and terms that are introduced by UMC are necessary for course learning. They are explained in specially developed glossary, whose content is connected with basic content of tutorials.

Guidelines make possible for students to organize independent work, project implementation and self-training to final course assessment.

Control block of UMC is a computer testing system that is oriented to self-testing of course learning results. In this UMC there are test tasks in author program shell (development of Institute of Distant Education of TSU) based on HTNL and script language JavaScript that helps to automate control process of taught knowledge. Test tasks are interactive in structure. Testing system makes random choice of two tasks: single choice tasks that stipulate one answer from the range of variants and multiple choice tasks that stipulate one or several right answers from the

range of variants. Upon completion test system enables to save the results, to analyze mistakes that were made in test and also gives an opportunity to be tasted again if it is necessary.

In consideration of safety activity course specific UMS includes automated trainer and teaching system (ATTS) that makes possible for students and also for specialist in civil defense and RSSE of educational institutions and heads of educational institutions and educational authority to train actions in different critical terrorist, criminogenic, natural and anthropogenic situations.

ATSS is client/server system that consists of server program located on server of Institute of Distant Education of Tomsk State University and client applications distributed on compact disks and by web-site or email [4].

Server stores the information about all trainings and registered users. It processes users' connections and users actions. Server program can process big amount of connections simultaneously that is limited by computer power and channel capacity and other external factors with regard to server.

Client application is executable file compiled to work in operating system Windows XP. Internet connection to ATSS server is required for work.

Trainer can be started in single or multiuser mode. In multiuser mode several people can participate at the same time. Each user carries out actions participants in concrete situation. In multiuser training situation development depends on several people at once making possible to train interaction in due situation. In single mode only one person is responsible for training and server plays the part of the rest of participants. It is possible to start several single and multiuser trainings. This enables to use ATSS effectively in distant education system.

Interactive multimedia compounds are used in trainer system. They enable to see current situation in a form of graphical picture or animation, and also to choose actions in alternative way that is closer to reality.

Thanks to facilities of trainer system students acquire practical skills of actions in emergency situations after the example of concrete practical tasks.

Educational and methodical complexes designed in 2006-2007 were approved in educational process and confirmed high effectiveness of the product.

In 2008 for the purposes of development of network studying system of safety activity in emergency and crisis situations on basis of contemporary information and education technologies in Tomsk State University automated computer complex with remote access was developed on basis of supercomputer "SKIF Cyberia" and Teleport of Tomsk State University to modeling and forecasting of emergency situations connected with air pollution. This complex is based on high performance computers, satellite technologies, methods of parallel computing and interactive technologies of studying and helps to improve new developed educational programs adoption and also personal and professional training of studying people in sphere of existing nature and anthropogenic risks for the purpose of technical, economical and psychological protection in multilevel educational institutions [5].

Program complex for numerical modeling of admixture transfer in atmospheric boundary layer over limited surface added early developed educational and methodical complexes of safety activity in emergency and crisis situations with new computer trainers that enable to model development dynamic of concrete emergency situation connected with atmospheric emission of harmful gas-dispersed admixtures and can locate and determine intensity of the emission by ground observation of ground air quality. Designing of educating computer trainers uses methods of mathematical modeling of gas-dispersed admixture transfer on ground layer of atmosphere and 3d visualization of calculation results that use opportunities of supercomputer of Tomsk State University "SKIF Cyberia" in remote access. Practical use of designed computer trainers enable for students to take a good look, analyze and make decisions in situations close to real disasters.

So in Tomsk State University the complex of educational and methodical materials is designed directed to realize safe activity education on the basis of contemporary information and

communication technologies. Actual educational and informational environment for educational activity of the institutes of higher education in safety activity sphere and in emergency and crisis situation is created on the basis of information computer technologies.

REFERENCES
1. Demkin V.P., Mozhaeva G.V., Golikov V.I., Nadtochiy I.L., Trukhin A.V., Voronin V.V., Timkin S.L., Shamets S.P., Distant Educational technologies in course of safe activity studying// Open and distant education 2008. № 3 p.56-63
2. Mayer G.V., Demkin V.P., Mozhaeva G.V., Vymyatnin V.M. Acadrmical university in open educational system. Tomsk: TSU Press, 2005. p.200
3. Theoretical bases of educational electronic issues creation / Belyaev M.I., Vymyatnin V.M., Grigoryev S.G. etc Tomsk: TSU Press, 2002. p.86
4. Trukhin A.V. Automated training educational system: computer trainer and scripts description language // Open and distant education. Tomsk, 2007. №3 (27). p. 47-56
5. Starchenko A.V., Panacenko E.A., Belikov D.A., Bart A.A. Mathematical supply of computer trainers for decisions making in emergency situation appeared as a result of

Старченко А.В., Панасенко Е.А., Беликов Д.А., Барт А.А. Математическое обеспечение компьютерных тренажеров для принятия решения в чрезвычайной ситуации, возникшей в результате аварийного выброса газодисперсного облака в атмосферу // Открытое и дистанционное образование. 2008. № 3. С. 42–47.