Ministry for Emergency Situations
of the Republic of Belarus

Institute for Command Engineers

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1. Educational program and structure
2. Education for specialists
3. Methods/forms of education and its evaluation
4. Education in fire prevention
5. Innovation, research and development

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EDUCATIONAL SOFTWARE "MY SAFE HOME"

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Educational software "My safe home" is based on 3D computer technology. The software system is designed to educate the public in the field of fire safety at home by simulating emergencies in buildings. The program ensures the formation of public knowledge on the safety and develops the habit of conscious safe behavior. Educational software creates the conditions for learning safety rules by game mode and is intended for developing the skills of effective identification of safety rules violation at home.

The purpose of the training program is to create the most complete simulation of presence in a residential facility through 3D modeling facility for safety education at home.

The program complex allows the user to read background information on a wide range of safety rules violations and to identify them. Educational software allows the user to move around virtual residential facility (such as "cottage" and "flat"). The user can look through his current location in premises of the residential facility. The program can operate in two modes: training and control (testing). In training mode the user has access to all safety rules violations within the chosen residential facility. This is achieved by highlighting areas of security violations by red spheres (fig.1).

If the user clicks this area, he can get acquainted with the specific fire safety rules concerning this type of violation. The user can trace his location on the plan of the object in order not to be lost in the premises.

In control (testing) mode the user can choose the level of difficulty and is prompted to seek out and identify violations (fig.2).

Fig.1. The user interface when operating in the training mode

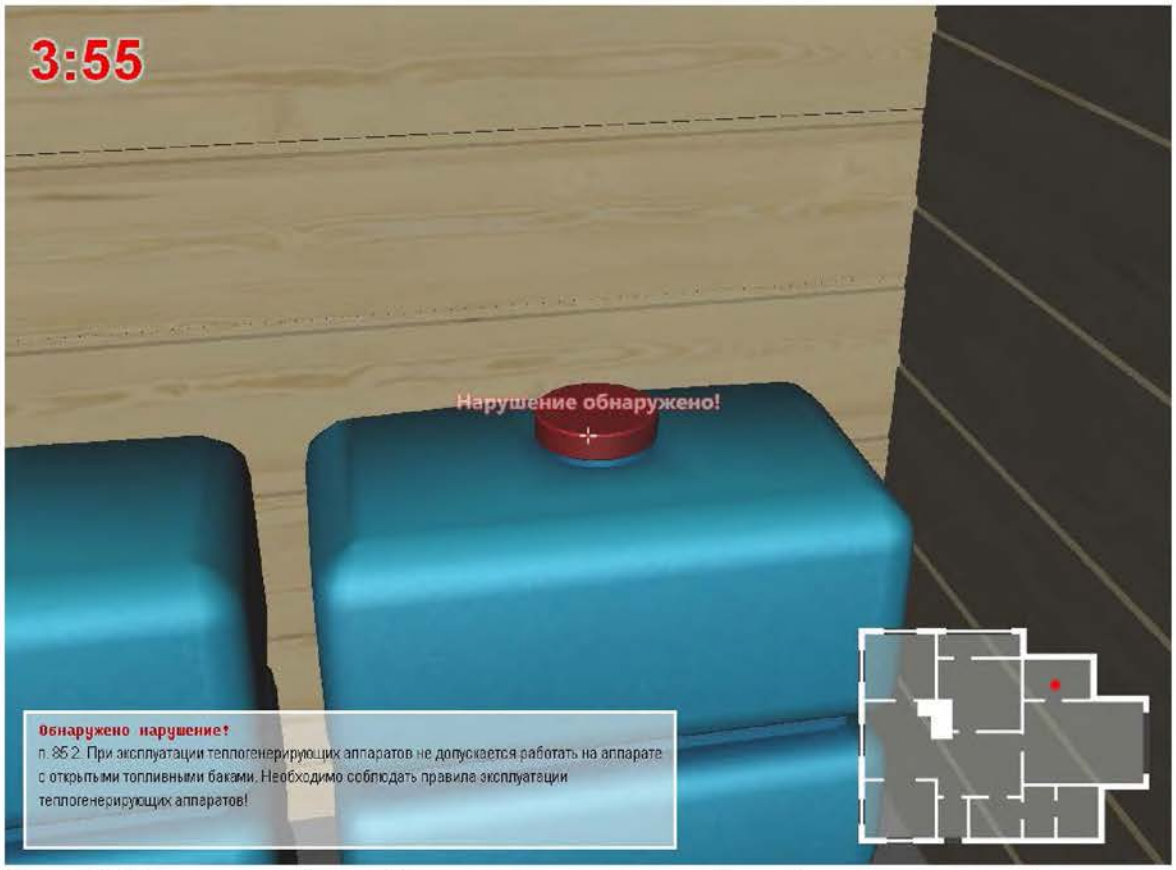

Fig.2.The user interface when operating in the control mode

This is achieved by marking the area of supposed safety violation. In control mode the execution time is limited by teacher. In addition, the teacher can choose the level of difficulty and the number of violations for each group of students independently.

After testing mode being passed through, the report is generated on effectiveness of detection of safety rule violation by the student. In addition, the program displays possible consequences if the user was not able to reveal any safety rule violation (fig.3).

Fig.3.The user interface after passing control mode

Thus, the educational software "My safe home" provides training in the field of safety in game mode. It helps to strengthen the skills of safe behavior in real life, which will reduce social and economic losses from hazards at home.

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THE DATUM POINT METHOD BASED ON THE FORMATION OF AN EMERGENCY DYNAMIC IMAGE

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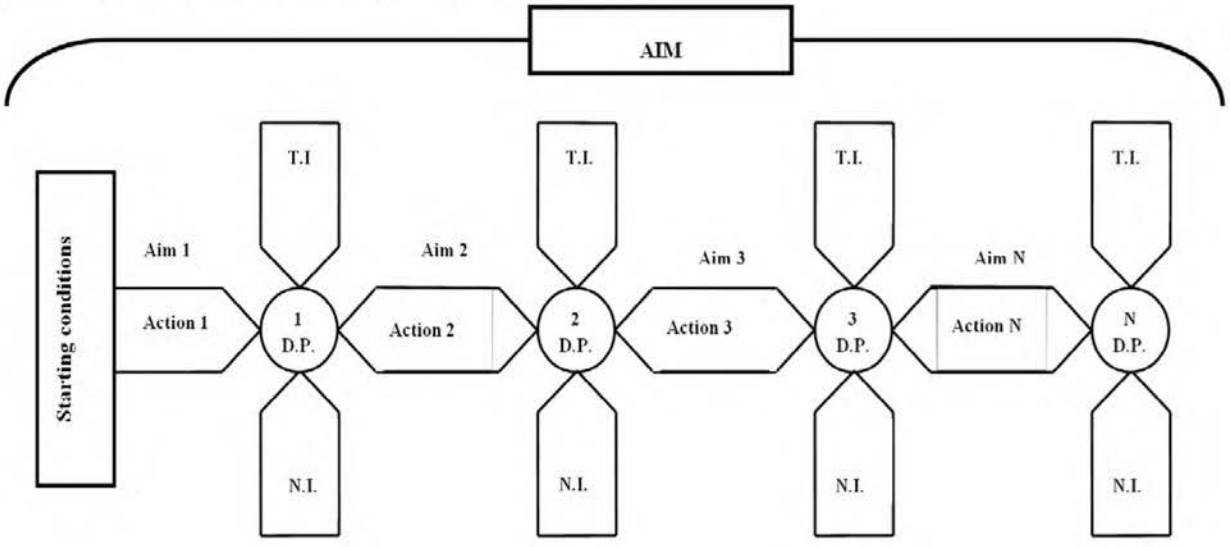
Creation of a common methodology and system of psychological rescue training is a necessary condition for solving the problem of efficiency and safety of actions of emergency elimination specialists. This methodology should take into account the characteristics of the image formation of various emergencies.

The start of every conditional part of work should be reflected in rescuer's consciousness in the form of aim during the process of fighting actions, which are referred to emergency elimination. A rescuer has to carry out concrete operations for achievement of this aim. The datum point is the place on space-time path of the emergency elimination dynamics, where the rescuer controls achievement of the previous aim and moves to achievement of the next aim (fig.).



Comment:
D.P. – datum point
T.I. – tool information
N.I. – non-tool information

Fig. The algorithm of an emergency elimination by datum point

Datum points are fixed. Specific informational picture corresponds with every datum point as a combination of tool and non-tool information. Tool information is the information, which a rescuer gets by means of devices and informative documents. Non-tool information is the information as a degree of smokescreen, noise level, vibrations, radiation heat intensity and etc.

Availability of information characteristics of datum points allow to explain, demonstrate and control understanding of emergency elimination goals under detached elements. These characteristics allow to form skills for using of different information for regulation of rescuer's actions using a general methodology. Therefore it is possible to make the process of image formation of the emergency more manageable and goal-directed. For this during the training period it is necessary to become acquainted cadets with choice of places on space-time path of the respective emergency dynamics and to study information characteristics of emergencies.

In the course of training general characteristic of non-tool information must be required from cadets, because in future in the process of real emergency elimination a rescuer can manage his own actions thanks to these characteristics.

Inclusion of information characteristics into forming emergency image allows to create similar image for every rescuer. Usage of such method conduces to accumulation of standards in memory. These standards are necessary for functioning of many components of full-value emergency image.

Conscious usage of non-tool information for regulation of actions allows to reflect the emergency dynamics immediately on sensation and perception level and to develop the sense of emergency.

The conditions for purposeful forming of emergency image compounds and relations between them are created as a result of such training.

Therefore in our opinion the development of psychological preparation methodology of rescuers will decrease considerably the origin of ambiguity in the process of special decision making in difficult conditions. This methodology should take into account questions of emergency image forming by specialists in the field of fire elimination. Besides that rescuers will have the possibility to be prepared to possible scenarios of concrete emergency development. Objectivity of assessment of the emergency situation could influence on saving of people's lives and health, as well as material values. This circumstance could decrease social and economy losses from emergencies.

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BY USING THE SOFTWARE IN PUBLIC LIFE SAFETY TRAINING

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Intensive development of modern technologies in various fields of knowledge is now the basis for the implementation of innovative solutions in the field of education. Use of modern information and telecommunication technologies for the automated training is the perspective direction in system of training of the population. Application software allows you to create an effective means of educating the public with minimal labor costs, thereby reducing the cost of training.

Building a culture of life safety by automating the process of learning is the priority direction in activity of the Institute for Command Engineers (hereinafter – ICE).

So ICE the software was developed for teaching people interact with dispatchers of emergency services in emergency situations (fig.1).

Fig.1. The training Call of Service of Rescue program

The interface of the training program in Russian. The software works in two modes: information and control. In information mode the trainee gets acquainted with service Ministry of Emergency Situations, work dispatchers, call rules, and also about responsibility of persons for a false call for special services (fig.2). In a control mode to the trainee depending on the chosen situation (fig.3) it is necessary to cause special service 101, to transfer necessary information to dispatchers, and also to hear to information on necessary actions before arrival of special services.

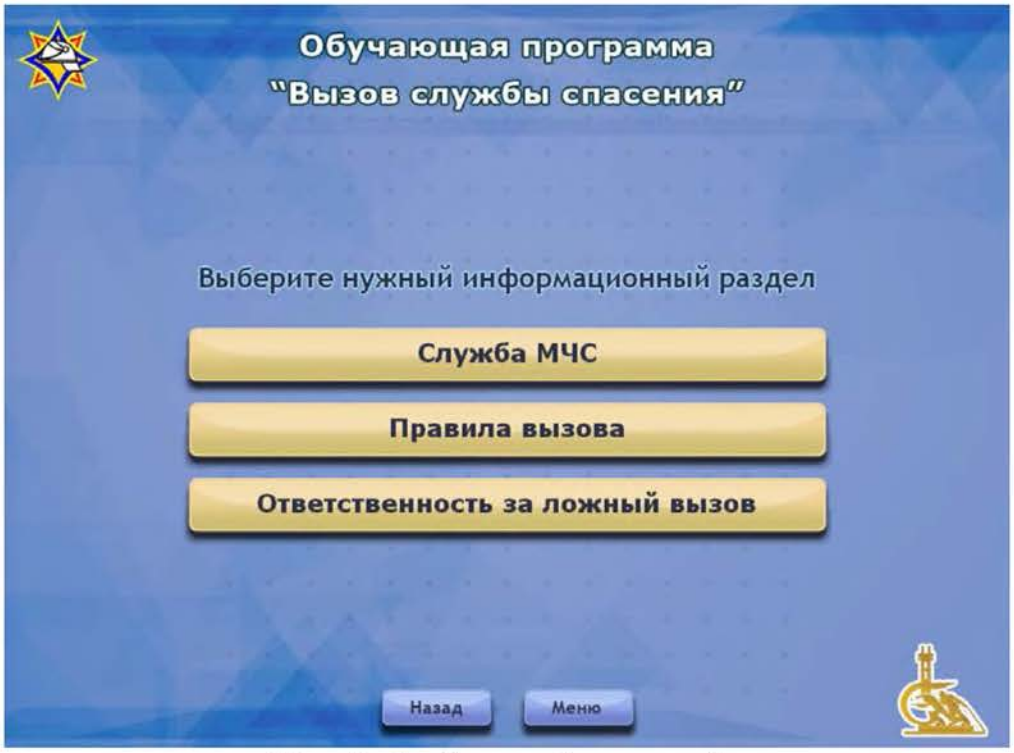

Fig.2. Information mode

One of the key is a sub-program the speech recognition subsystem that is used as an auxiliary system for determining a user response to the current state of the graph to increase the realism of the situation. Thus the system of recognition of a voice will make check on compliance of entrance information to available options of a choice, and, in case of coincidence to a mistake isn't higher set, will automatically carry out conditional transition. The user also may enter the information in training program by selecting the answer choices on the screen (fig.3).

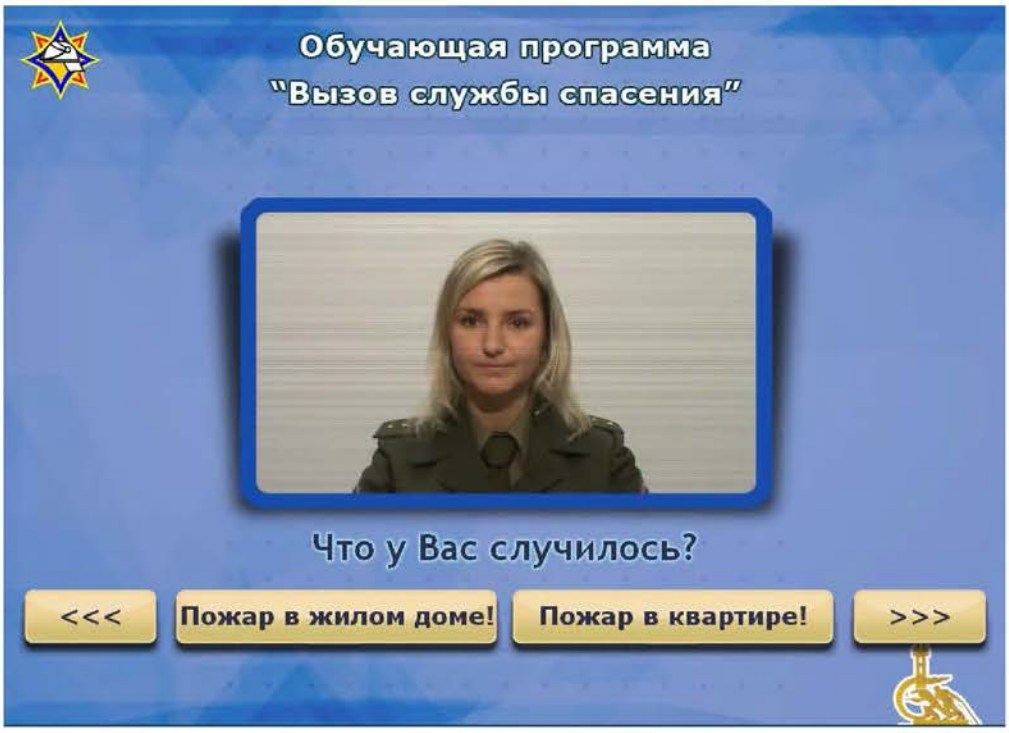

Fig.3. Control mode. Choice situation

The software is a way to improve public safety in everyday life. Introduction of the software will promote increase of efficiency of reaction at threat or emergence of emergency situations of natural and technogenic character. Will reduce the time required to retrieve the messages from citizens and organizations to implement emergency measures for the prevention and elimination of emergency situations, prevention of development of local emergency situations in emergency situations of bigger scale.

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EDUCATIONAL SOFTWARE FOR PREPARING SPECIALISTS FOR STATE FIRE INSPECTION

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To increase the effectiveness of educational process at the Institute for Command Engineers there is developed specialized educational software «Educational software for preparing specialists for state fire inspection».

The main idea of application of this software is the automation of teaching process on the base of simulation of activities in virtual reality. For this purpose, into classical teaching scheme - theoretical course / practical course – is added a virtual course. During this course knowledge and practical skills are trained in virtual reality.

In the base of this software has been laid the virtual 3-dimensional model of an industrial enterprise (fig.1).

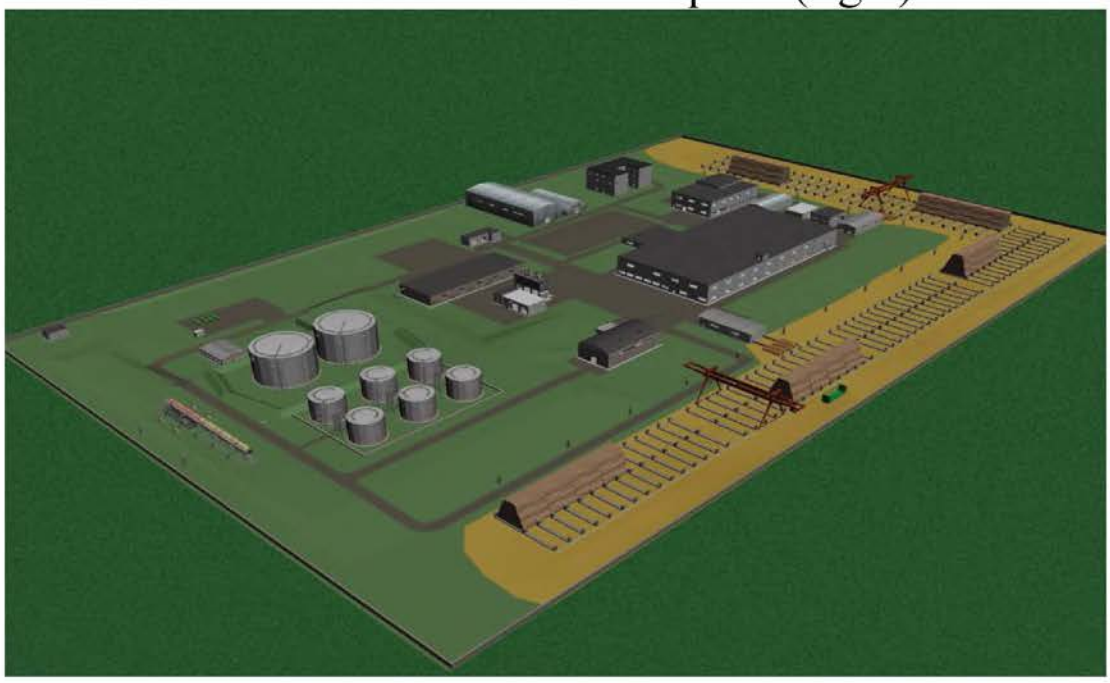

Fig.1. Virtual 3D model of the industrial enterprise

By the development of this model were used technological processes which are the most typical for Belarus (fig.2).

Fig.2. Discharge jetty with a park of oil-products storage

This virtual model comprises 22 buildings, more than 200 compartments, more than 5 000 constructions and units of equipment. The particular distinction of this software is imitation of the situation inside buildings taking into account equipment and communications. This makes the inspection of the object more realistic.

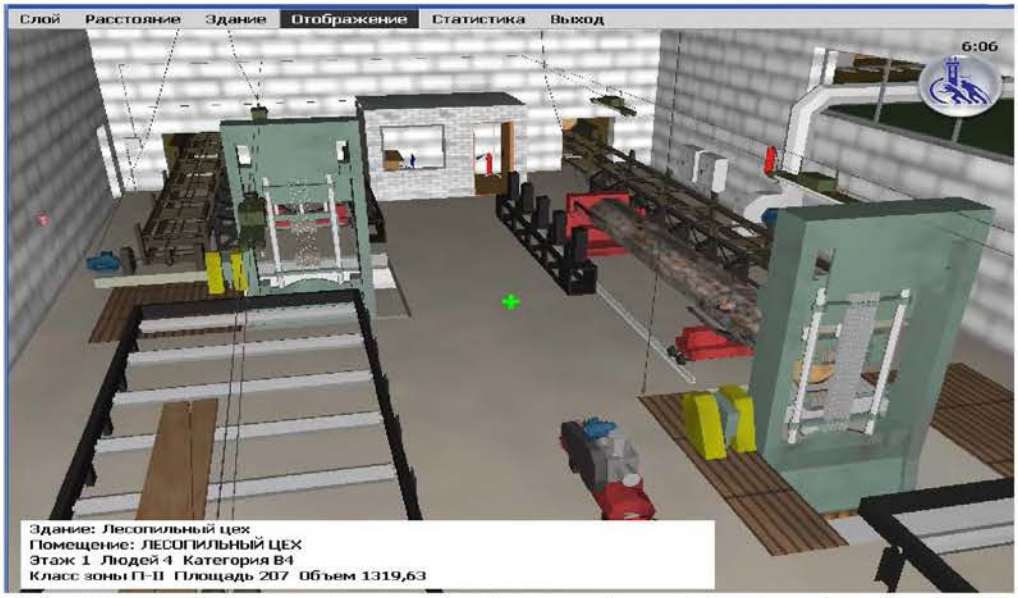

Fig.3. Complete imitation of the situation inside buildings

The main task of the cadet is to reveal violations of norms and rules of fire safety. To achieve this task the cadet has access to all

necessary information concerning buildings, compartments and separate objects. If necessary, he can look through construction documentation. And axonometric views of engineering and technological systems both in the whole and taken separately (fig.4).

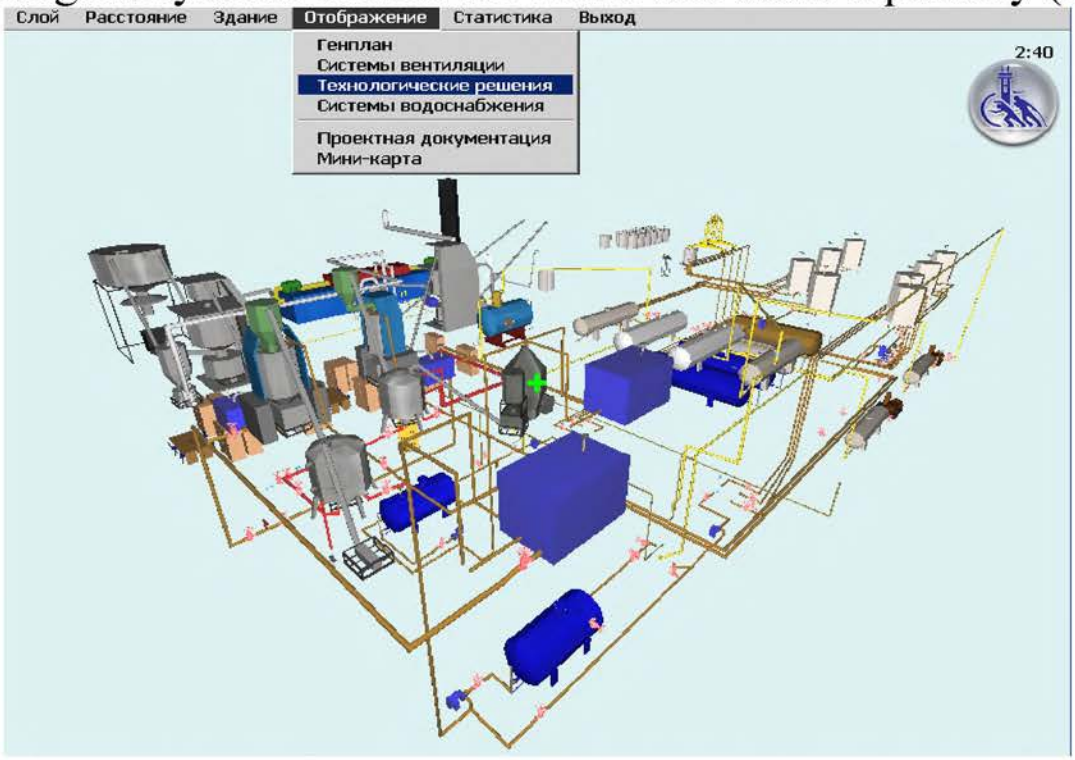

Fig.4. It is possible to view axonometric perspective of technological and engineering systems

The fixation of revealed violations can be realized by built-in note pad or automatically by context menu. According to the results of inspection, the report is presented automatically where the percentage of revealed violation for each layer is given. This information can be given in details for separate building. It is possible to form full list of violations revealed by the user. This software can function in teaching and test modes. In teaching mode, the cadet can move from one building in another after revealing the percentage of violations indicated by the teacher. In test mode, the cadet is limited only by the time given for inspection. The advantage of this software is the system of flexible fixation of violations and the possibility of unlimited amount of violations' variants created by the teacher. The teacher can change text information in the description of objects without involving the programmers. Now, the program contains 5 400 violations in its data base.

UDC [811.111:37.091.315.7]:614.8

DEVELOPMENT OF ENGLISH COMMUNICATION COMPETENCES FOR SPECIAL PURPOSES AT THE INSTITUTE FOR COMMAND ENGINEERS

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Integration of academic matters is one of the leading principles in today's higher school education. According to the state higher educational standard, the expert specialists should posses a number of competences including general academic, social, personal and special professional competences. It is evident that the development of these competences can be achieved by integrative approach to the process of education. [1, 5].

Social and personal competences of up-to-date high level specialist include foreign language skills because global integration of technologies and science worldwide requires definite skills and knowledge in the field of international business communication. That is why the course of foreign (English) language has interdisciplinary character and aims to the development of language competences necessary for future professional spheres of students. This approach in teaching language is known as English for Special Purposes (ESP) which is different from English as Second Language (ESL). There are several differences between the ESP and ESL which concern: 1) aims of teaching; 2) language material to be assimilated; 3) focuses of syllables; 4) roles of teacher and trainees; 5) age of students.

These differences could be presented as follows.

Specialists in teaching second language assumes that ESP "combines subject matter and English language teaching. Such a combination is highly motivating because students are able to

apply what they learn in their English classes to their main field of study" [2] and thus, their motivation increases.

Table 1. Differences between ESP and ESL

	Aims	Material	Focuses	Roles	Age of trainees
1	2	3	4	5	6
English for Special Purposes (ESP)	Development of selected skills necessary for profession	Authentic, very specialized	Language in professional context	Teacher: moderator, expert, consultant Student: highly motivated driving force, selecting materials on his own	Usually adults
English Second language (ESL)	Development of fall our basic skills: speaking, reading, listening, writing	Adapted, not related to any professional subject or style	Grammar, vocabulary, language of everyday life	Teacher: decides everything, select materials. Student: can be not motivated, cannot change the direction of teaching or materials	Any

Specialists in the field of prevention and elimination of emergencies need English language for various tasks. For example, for working on technical documentation concerning new methods and equipment for fire extinguishing, foreign regulations and standards on fire safety of buildings and construction. They have to be able to communicate in oral and written form with their foreign colleagues during business visits and professional stages, at conferences and meetings. Postgraduate officers should be able to take part in joint sessions, international conferences and forums

devoted to the problems of safety. They need special skills for preparing presentations on topical professional subjects, compiling a scientific report or write a scientific paper to publish it in foreign professional journals. Officers-teachers should be able to look through foreign internet sites in order to kip the track of emergency events in the world and to share the methods and techniques of teaching special disciplines with their foreign colleagues. Thus, on one hand, reading and academic writing skills should be in focus while teaching both staff of units and subunits (junior officers) and post-graduate officers carrying out scientific research. Speaking and listening skills are necessary for officers – teachers and specialists in public relation and international relation in the field of life safety.

One of the factors of successful special English teaching is the selection of learning materials, texts. [3] They should be highly informative, topical, challenging as for the teacher and for learners. Those texts have to be authentic, filled with terminology, carry characteristic elements of scientific and technical style. The selection of material is determined by the syllable of special discipline, the most important topics should be stressed. It is worth to point out that due to the development of information medium of the Internet there is no problem in finding necessary information, but there is a question of selection. While selecting materials there is a need in assistance of specialized chairs.

Thus, appropriately selected material is the first step to the development of professional language competence. The next step is a didactic preparation of terminological vocabulary, and types of exercises. Preparation of tasks and exercises has four main aims. The first: presentation of terminological vocabulary. The second: assimilation of terminological vocabulary while reading a special text. The third: mastering similarities and differences between terms in different languages while working with all kind of dictionaries. The fourth: activation of assimilated terms in speech exercises. A special attention should be paid to the concrete communication methods and types of exercises.

Assimilation of terminological vocabulary starts with correct reading and spelling of the term, through the analyses of its structure and appropriate translation to fluent using in prepared and spontaneous conversation. On the stage of vocabulary training both traditional and innovative methods are used. Besides traditional exercises such as selecting of synonyms, antonyms, inserting, filling the gaps vocabulary games can be proposed. For example, on the base of the definitions several games can be proposed. Thus, if we have the definitions:

- a *tornado* is a highly concentrated vortex of wind that occurs in extreme thunderstorms
- a *flood* is an overflow of any amount of water that reaches land
- an *earthquake* is any seismic event — whether a natural phenomenon or an event caused by humans — that generates seismic waves.
- a *hazard* is a situation that poses a level of threat to life, health, property, or the environment.
- an *emergency* is a situation which poses an immediate risk to health, life, property or environment.

the following games can be organized.

Game 1. "Split crossword". Participants are divides into pairs. They get a sheet with the crossword with empty cases. The participants have to find a necessary term and to help the partner to get a right term according to the definition.

Game 2. "Definition race". All participants have to remember the term basing on the definition, and to fill in the box. The time is limited.

Definition 1. Highly concentrated vortex of wind that occurs in extreme thunderstorms

Definition 2. An overflow of any amount of water that reaches land

Definition 3. Any seismic event — whether a natural phenomenon or an event caused by humans — that generates seismic waves.

Definition 4. Situation that poses a level of threat to life, health, property, or the environment.

Definition 5. Situation which poses an immediate risk to health, life, property or environment.

Game 3. «ABC terms race». The participants are divided into pairs. They have to remember terms on each ABC letter. The game stops as soon as the first pair comes to the letter Z.

Game 4. «Power of imagination». The participants are divided into teams; each team picks out a term. The representative has to present this term using jesters and mimicry. Another team has to guess which term is meant.

The technique of games is rather developed for the English Second Language [5] but is being completely new for the English for Special Purposes.

After having worked on meaning of terms it is necessary to take them in context that is to read, understand and translate special texts. Nowadays due to the Internet, there is a great possibility to find any kind of authentic materials which can be used in teaching special language. Those sites can be used: http://www.london-fire.gov.uk/news; http://www.nbcert.org/DisasterPreparation.htm (Disaster preparation); www.firefighteracadem, and many others. As a rule, the subject areas correlate with the syllabus on professional disciplines. In connection with the tasks of translation there is a problem of using electronic and on-line translation tools. In our opinion, the particularities of automatic translation of special texts should to be taught to the students, especially the questions concerning text editing. But that could be the topic of separate research.

On the stage of the development of oral communication skills in the frame of professionally significant topics both traditional and innovative methods can be used. Thus, while organizing case study or discussion, the method of "Parallel thinking (Six-hats method)" [4], is very effective. Also, there is the techniques of "Study stations" (for complex training and testing), the method of "Simulation plays" or "Role plays" (development of professional oral communication skills strictly attached to the real situation in business field).

All these methods and techniques can be supported by innovative software "Dialogue NIBELUNG". This software is designed for the transformation of a computer class into interactive multimedia. All computers in the class are connected into a network which allows transferring and distribution of audio, video, Power Point and text files. Teacher's computer is used as s server and stores any kind of information which can be transmitted to student's work place. The teacher can communicate with each student via chat or short messages without disturbing the work of other student in the class. The software gives the possibility of controlled web-browsing, using on-line dictionaries and on-line tests. By the way, the software "Dialogue NIBELUNG" has its own test constructing tools which allow creating tests for special purposes. [6].

In conclusion it is to be pointed out, that modern approaches and techniques of teaching second language at the Institute for Command engineers give the students good chances to master foreign language and to use it in professional activity.

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SOME ASPECTS OF FIRE RESISTANCE DETERMINATION IN ENGINE HOUSES OF NUCLEAR POWER PLANTS

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First nuclear power plants in Ukraine were put into operation in the period from 1981 to 1987. Therefore, according to the project documents, their lifetime expires in the next 10 years. The preparation to work over the design life is currently in process. Improving of the building structures fire resistance is one of the most important tasks.

In 1993, due to the request of Ministry of Internal Affairs of Russian Federation, the research "Proposals for the protection of engine houses with steam turbines bearing structures from the effects of fire hazards" was performed [2]. The resulting calculations and models show that the fire of hydrogen and oil mixture, caused after the turbine destruction, is able to heat the metallic bearing constructions up to 500 °C in 25-30 seconds, and the temperature of hydrogen fire is 2000 °C. In 2005, almost at all Ukrainian NPPs the fire protection of bearing constructions to the fire resistance of R 45 was performed. It is worth to emphasize that the coatings were tested in standard fire conditions [1].

It should be noted that according to the current Ukrainian regulations both the constructions and fire-protective coatings should be tested in standard fire conditions, wherein a volume average temperature does not exceed 1000 °C.

On this basis, it can be concluded that the existing test methods for building structures and fire-protective coatings can't make an objective assessment of the metallic constructions fire resistance. Experimental confirmation of this conclusion can be found in [1].

In this regard, we suggest introducing some additions to a test procedure of fire-protective coatings. These changes would touch the fire protection of metal structures in engine houses of NPP and other buildings where explosive gases are used. Fire-protective coating should be applied to one side of the metal plate with subsequent testing with the special laboratory facility. The proposed design of this facility (fig.1) allows recording the time of heating to temperatures above 500 °C), the behavior of fire-protective coating, the pressure of gas jet, temperature changes on the unexposed side of the metal. According to the experimental data, the optimal size of the steel plate is 200x200 x4 mm.

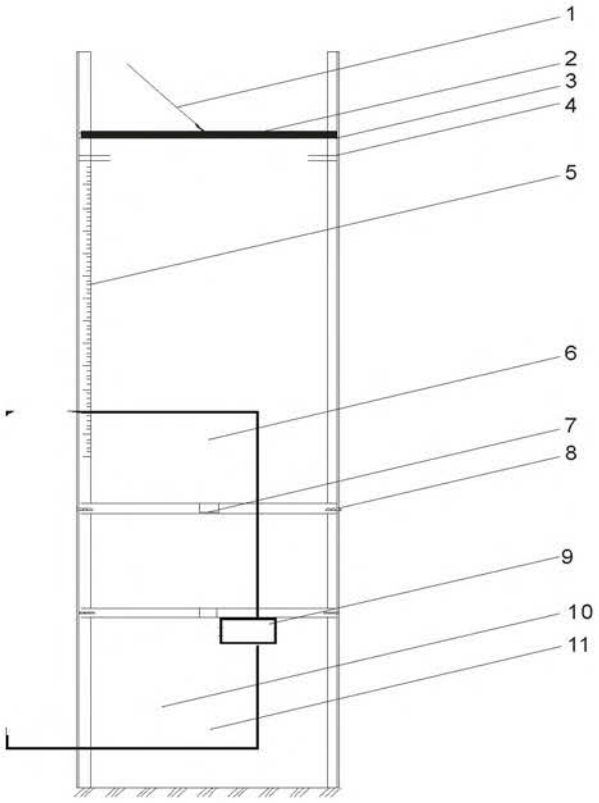

Fig.1. The laboratory facility for fire-protective coatings testing: 1 – thermocouple, 2 – the sample, 3 – fasteners of the sample, 4 – fasteners of the fire-protective plate, 5 – ruler (distance scale), 6 – acetylene torch with detachable nozzles, 7 – fasteners of the torch, 8 – catches to move the torch, 9 – gauge, 10 – oxygen nipple, 11 – acetylene nipple

Such tests can provide a more objective assessment of the fire resistance of bearing structures, as well as to avoid unpredictable changes in the structure of fire-protective coating exposed to temperatures greater than 2000 °C.

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POSTGRADUATE EDUCATION IN THE INSTITUTE FOR COMMAND ENGINEERS

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Academic Master's Degree. Magistracy in the Institute for Command Engineers is the second level of higher fire & emergency safety education and mandatory step before postgraduate education. Its main purpose is to train specialists for research and teaching, as well as working in the public emergency administration. A necessary condition for access to magistracy is the completion of training in the first stage of higher technic education, as evidenced by an appropriate certificate.

Magistracy has a special, personal training program aimed at preparing self-study research activities. Preparation of a master's degree candidate includes the passing of semester tests and examinations, training and defending of the master's thesis. After successfully defending master's thesis State Examinations Commission assigns the student an academic master's degree indicating the field of study (eg, Master of Technic), as evidenced by a master's degree. Master's degree entitles the holder to postgraduate studies, as well as for employment in accordance with the direction of training or with regard to the qualifications obtained in the first stage of higher education.

Science education. Training of scientific personnel of higher fire & emergency safety qualification in the Institute for Command Engineers is held at post-graduate studies or research-graduate studies. The approved by Academy of Sciences specialties for fire safety are: 05.26.03 – fire and industrial safety or 05.26.02 – safety in emergencies.

Post-graduate is only one of the stages of full post-graduate education, which aims to prepare highly qualified scientists with the

award of the degree of candidate of sciences (Ph.D). Postgraduate studies include in-depth study of the general and special subjects, the change set of candidate examinations and tests, preparing a thesis for the degree of candidate of sciences. Postgraduate studies is a full-time (duration 3 years) and part-time (4-year training) form. Ideally, post-graduate studies must include the protection of the master's thesis, but it can be finished without protection. The post-graduate students are considered as successfully completed studies if they had presented the thesis held in the prescribed manner a preliminary examination and recommended for protection.

Research-graduate studies - an alternative form of training of candidates of sciences (Ph.D). Duration of training in this form has not to exceed five years. Learners in the form of Research-graduate studies for PhD degree may be individuals with a higher education diploma (with the exception of the bachelor's degree) and (or) a master's degree, a tendency to scientific research, as evidenced by scientific publications, participation in research projects, scientific conferences, seminars, or other materials. They need to have practical experience of at least two years on a profile corresponding to technic sciences that is being credited for their learning in the form of research-graduate studies.

The degree of Candidate of Sciences degree is awarded by the Dissertation Consul on the basis of protecting the corresponding thesis. Then Academy of Sciences decides to issue a diploma candidate or doctor. PhD degree exists only in the CIS countries. By the way, the system degree and diploma candidate is absent in countries included in Bologna process. For this reasons foreign citizens are granted in the Institute for Command Engineers an equivalent diploma PhD degree PhD (Doctor of Philosophy (Ph.D). Diploma PhD (Doctor of Philosophy (Ph.D) may be issued also to the citizens of the Republic of Belarus, unless required by their professional activities. The current legislation in Belarus provides for a number of special conditions and additional payments for those with an academic degree or title.

UDC 614.84

MODULAR TRAINING COMPLEX ON THE BASIS OF THE METAL CONSTRUCTIONS OF CONTAINER TYPE FOR TRAINING FIRE FIGHTERS IN THE CONDITIONS OF IMPACT OF THE DANGEROUS FACTORS OF FIRE

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Institute for Command Engineers of the Ministry for Emergency Situations of the Republic of Belarus

The combat work of fire fighters and rescuers takes place in the conditions of the integrated impacts of the dangerous factors of fire: flame and sparks, high ambient temperature, toxic products of combustion, smoke, lower oxygen concentration. In these conditions, the key to successful suppression of fire, people life-saving and maximum safety of the rescuer personnel is in the well coordinated and competent work of the combat crew what assumes quick assessment of the evolving situation. Therefore, the organization of the training of the cadets is of great importance – heat, smoke, light and sound effects have to be adequately simulated concerning both the development of an emergency situation and the realization of the combat operations for its elimination.

In the Republic of Belarus, the training of the fire fighters under the impact of the dangerous factors of fire is achieved through the use of a variety of simulators and training complexes (TC): strips of mental preparation, heat- and smoke-chambers, target and firing ranges, etc. However, the analysis of the effectiveness of the TCs in the fire-units of ME has shown [1] that they do not fully meet modern requirements for training of fire fighters, which is mainly due to their low functionality, simplified design of elements, control systems, management, etc. The TCs are widespread in Russia, Germany, Poland and other countries

[2,3], and they also have a number of drawbacks, the main of which are: a limited number of actions and operations performed by the fire fighters – the training is reduced mainly to the skills of the orientation; limited technical capabilities of modeling of the real-life fires; high cost.

In the Institute for Command Engineers of the Ministry of Emergencies of the Republic of Belarus, a modular training complex (MTC) is being constructed on the basis of the metal constructions of the container type. The MTC should be more fully meet the modern requirements: equipment with the systems of fire-impact effects, smoke simulation, smoke removal, sound and light effects, as well systems of lighting, tracking, emergency evacuation and temperature monitoring.

The design development of the modular blocks, the systems of electricity and fuel supply has been carried out with requirements that the compartments of the MTC should be equipped with:

- System of protection of wall and ceiling constructions;
- Mechanical doors of steel;
- System of the emergency lighting;
- Protective grounding system;
- Installed special technological and electrical equipment;
- Systems of operating and emergency ventilation.

The MTC has been worked out taking into account the opportunity to model the closed compartments of various types (residential, public, industrial); therefore, the training elements should realistically reproduce the appearance and characteristics of the simulated objects.

The blocks of the MTC during suppression of the training fire are exposed to the multiple temperature changes, as well as the influence of water and fire extinguishing substances; therefore, they should be consist of the materials that are resistant to manifold temperature increase followed by rapid cooling, mechanical stresses of the bearing constructions, and gas and liquid corrosion.

The use of standard shipping containers of 40 feet length (High Cube) as a unifying carrier core appears to be most practical from both technical and economical point of view. The rigid construction of the steel container (Fig.1) has the dimensions 12190×2440×2890 mm.

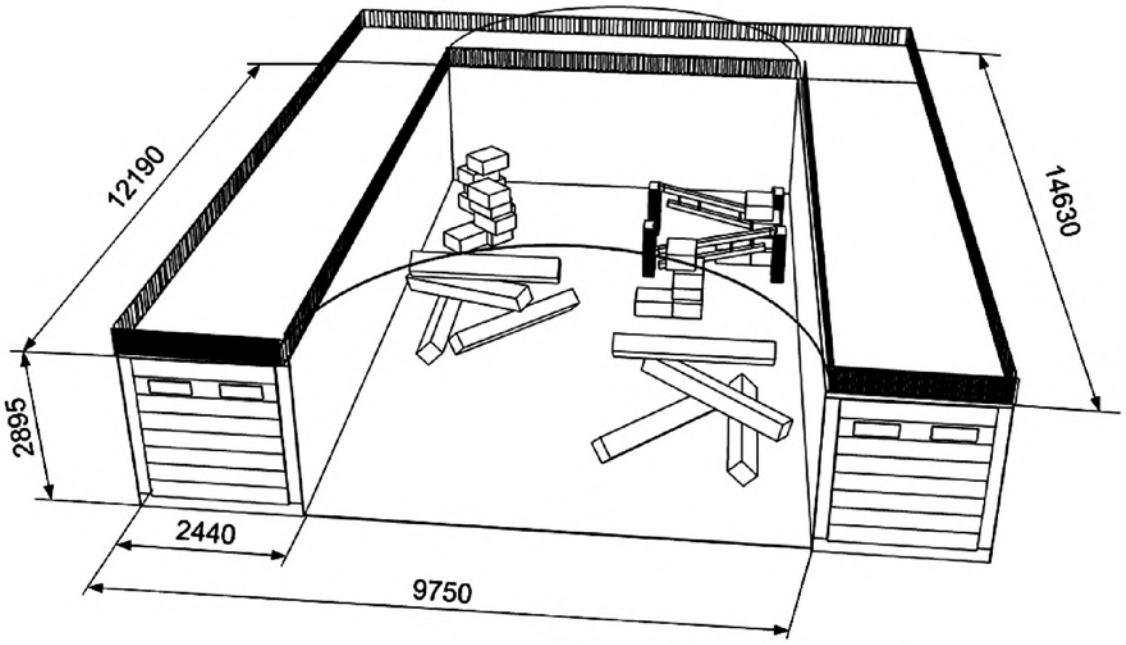

Fig.1 – General view of the modular training complex on the basis of metal constructions of the container type

The metal construction of the container enables to make doors, windows, etc. without much increase in material costs. The container does not lose its rigidity under fire impact on the component part. Universal construction allows the container attach in a different position both in horizontal and vertical plane.

The structure of the control of the MTC includes a number of systems, including:

- Lighting control system;
- System of acoustic communication and sound simulation;
- Control system of training simulators;
- Control system of ventilation and smoke removal;
- Control system of smoke generation;
- Monitoring system of temperature in the compartment;
- Firing modules;

- System of collection and disposal of extinguishing agent;
- System of surveillance cameras;
- System of emergency stop.

The training of fire fighters can be provided by the simulation of the fires both in residential and industrial compartments (Figures 2 and 3).

The following model of a fire in a residential area (figure 2, B) will be involved in the training process:

- Simulator of burning kitchen (1);
- Simulator of burning sofa (2);
- Simulator of burning TV-set (3);
- Simulator of burning door (4);
- Simulator of volumetric ignition (5);
- Simulator of burning staircase (6);
- Simulator of burning pipe and cable tray (7);
- Simulator of burning liquid on the floor (8);
- Simulator of burning gas cylinder (9).

As training sites for the simulation of a fire in the industrial workplace (fig.3) are:

- Labyrinth with a variable layout (1);
- Simulator of "Barrel" (2);
- Simulator of "Pipelines" (3);
- Simulator of "Slippery Floor" (4);
- Simulator with the overcoming of the obstacle (5).

We also provide a system of the sound and light effects held for additional psychological load of the trainees.

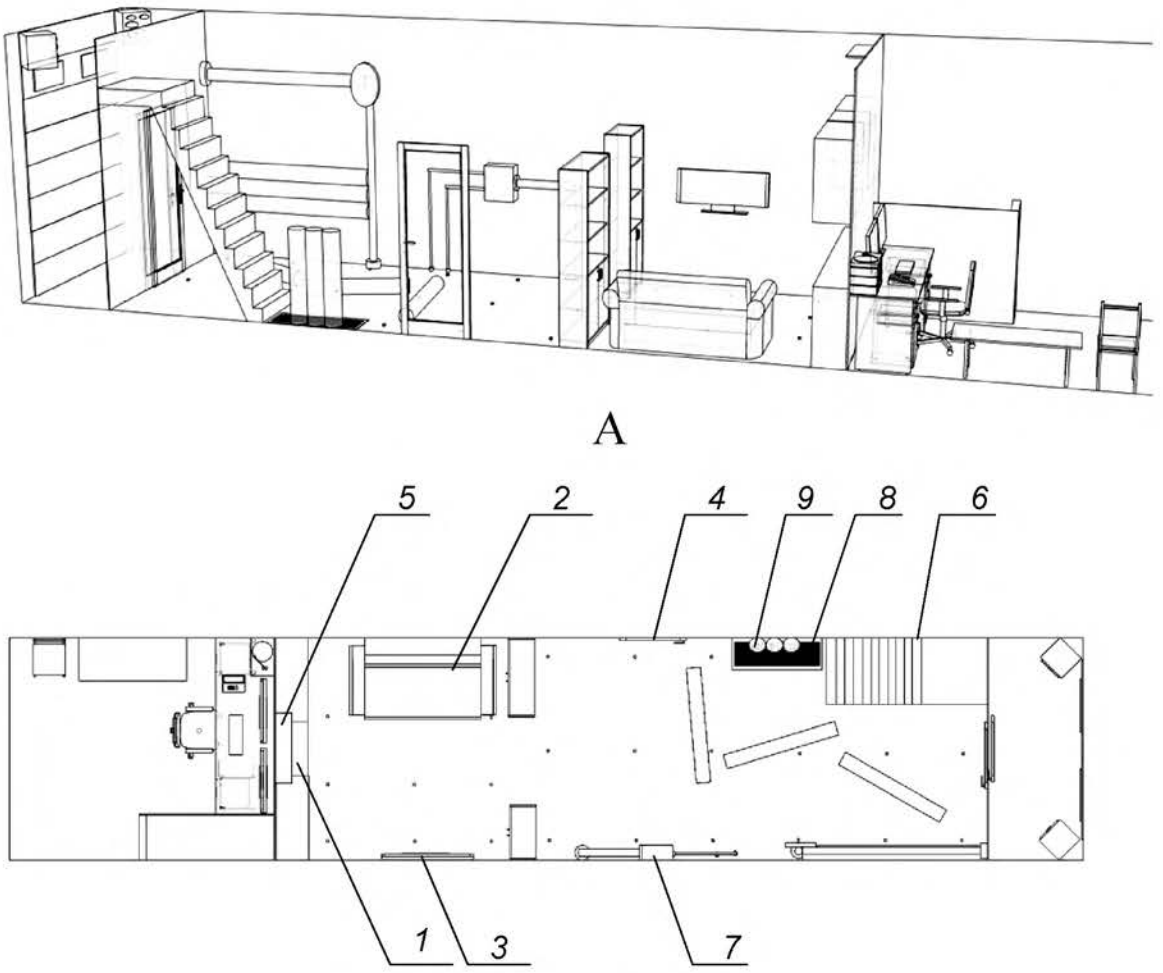

Fig.2 – View of the training module simulated the living room

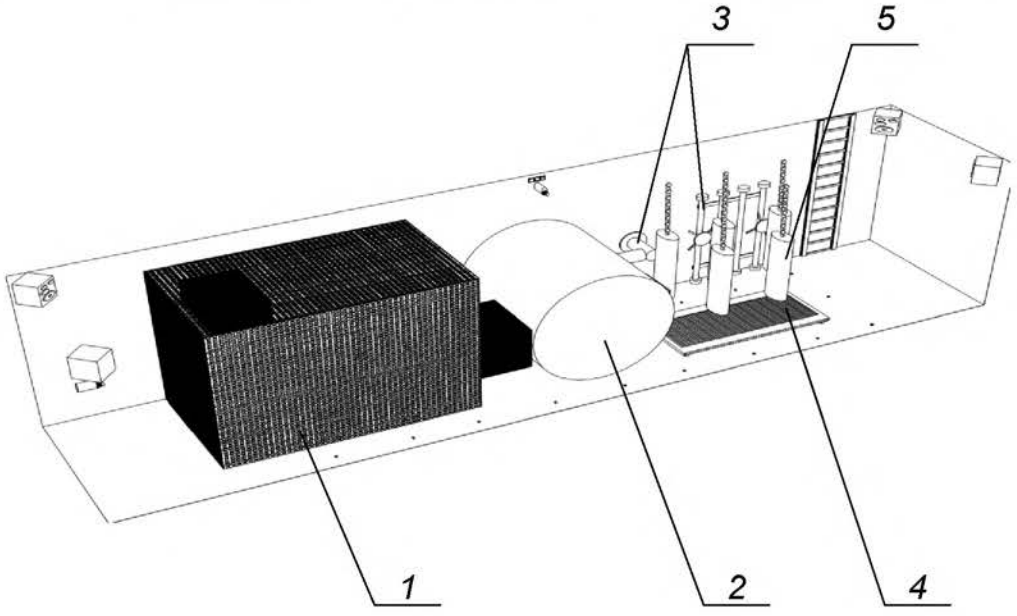

Fig.3 - View of training module simulated an industrial facility

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UDC 614.84

MODULAR TRAINING COMPLEX FOR SIMULATION OF THE DANGEROUS FACTORS OF FIRE: SYSTEMS OF CONTROL AND FUEL SUPPLY

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In our paper [1], the main features of the modular training complex (MTC) have been described which being is built up in the Institute for Command Engineers of the Ministry of Emergencies of the Republic of Belarus. The developed MTC basing on the shipping containers destines to training for the fire fighters in the exposure of the dangerous factors of fire: high ambient temperature, lower oxygen concentration, smoke, and flames. For operation of the complex and for the security of the trainee, a number of systems are provided for including the systems of fire impact, smoke removal, smoke-, sound-, and light-effects, lighting, video surveillance, emergency evacuation, etc. [1]. This report presents details of management and fuel supply systems of the MTC.

The MTC control system is a core of the training complex, it is designed to provide continuous monitoring in the course of training, communication maintaining, as well the realization of management of the cadets in the training blocks by the instructor, including the necessary changes for the assigned tasks.

The control system monitors:

- Lighting;
- Acoustic communication and sound simulation;
- Ventilation and smoke removal;
- Smoke generation;
- Concentration of the vapors of the combustible substances;

- Compartment temperature;
- Firing simulators;
- Emergency stop.

The management of the MTC is realized in automatic and manual mode. The automatic mode is basic; it also duplicates the manual control. In the automatic mode, the control panel and three controllers of the company «Pixsys» (Figure 1) are used. Programming of the controllers is carried out using specialized software which consist of the program PLprog, necessary to record the internal logic of the devices, and the program TDdesigner, that implements the graphical display on the LCD panel.

The management of both opening and closing of the burner valves, electric ignition, ventilation mode, and emergency mode is performed by connecting of the appropriate relay to the digital input/output controllers. The thermocouples, necessary to control the flame temperature, are connected to the analog inputs. The operation of the controllers system is provided by the direct voltage of 24 V.

The instructor can also use the manual control mode in the course of training. In particular, if he considers the actions of the trainees sufficient to extinguish the burning element, he can turn off the burner [2].

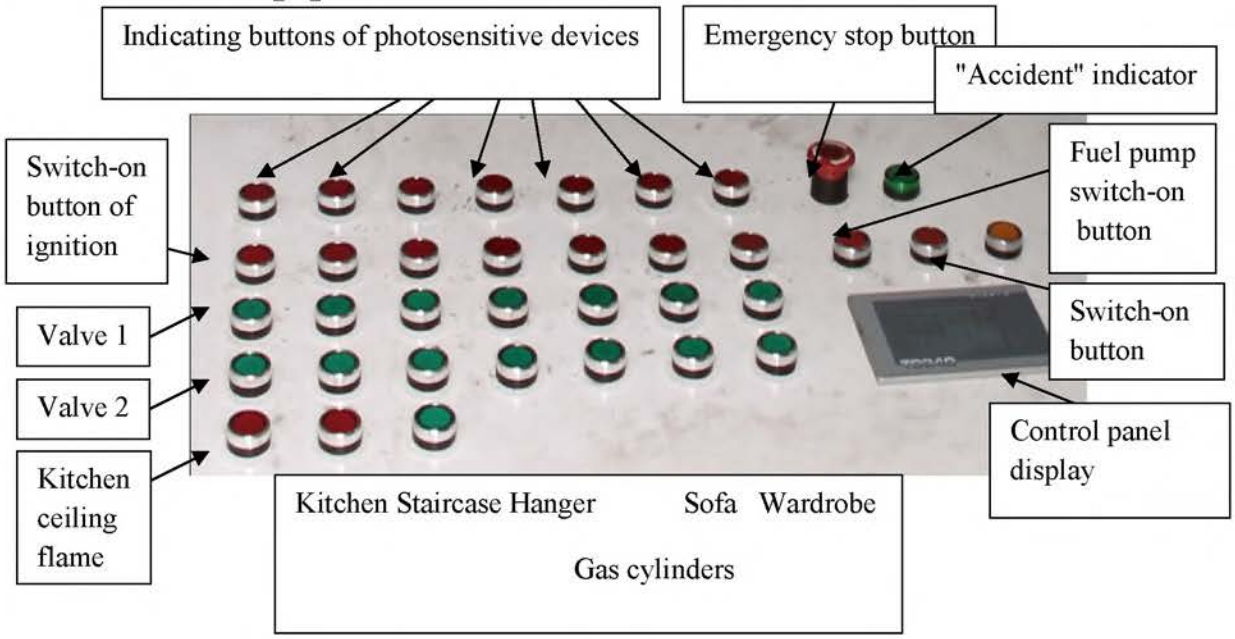


Fig.1 - General view of the control panel

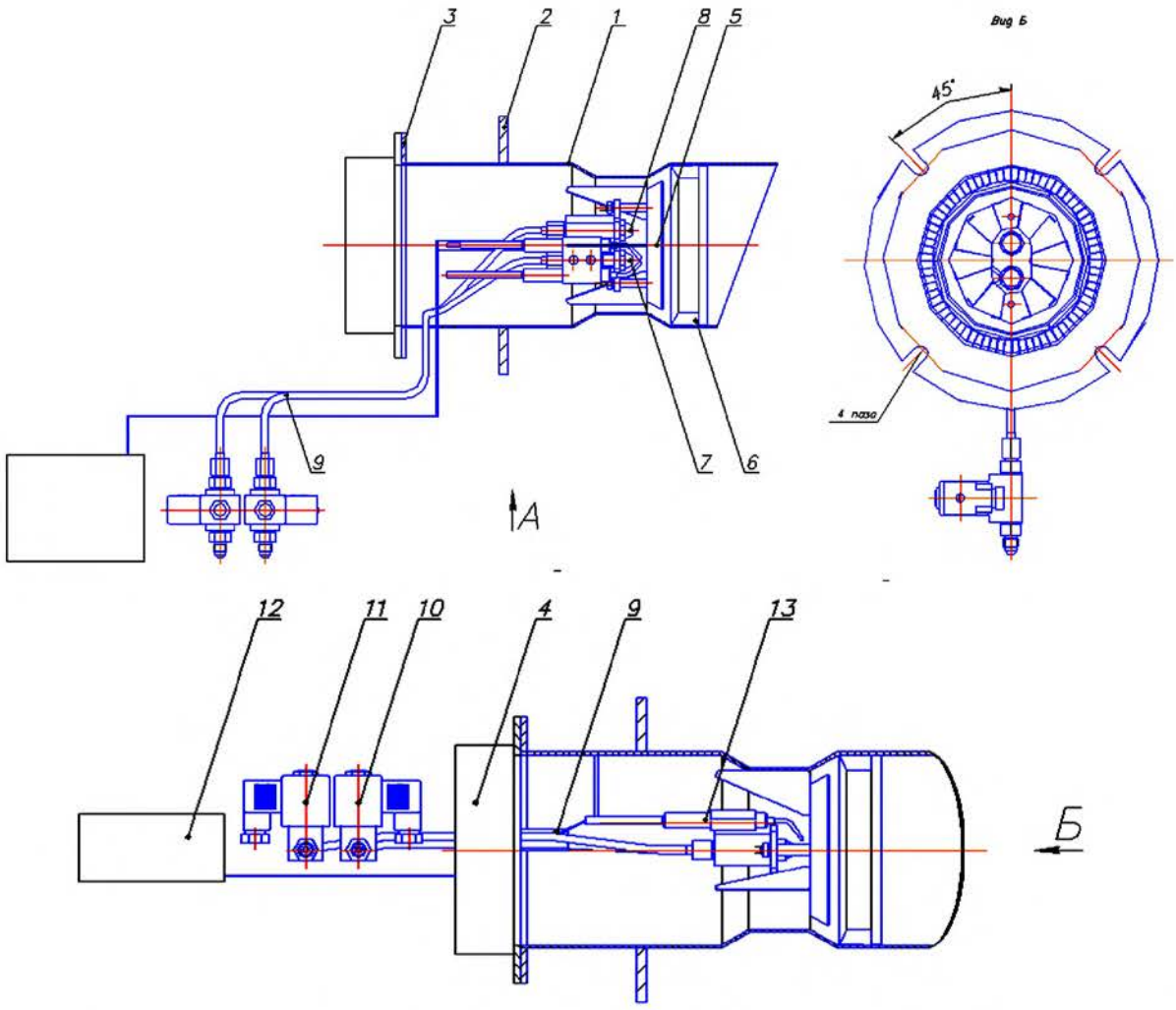
Fuel supply system of MTC provides six areas of the combustion. For the implementation of the flaming burning, the burners have been manufactured which use the liquid fuel (diesel, furnace). The burner has two nozzles with flow rate of the diesel fuel of 10.2 l/h and 16.0 l/h, respectively. The burner can operate in three modes: "Small Fire", "Moderate Fire", and "Big Fire" what allows change the size of ignition for more diverse fire simulating. The automatic system can commutate the modes, and the valves are switched with the time delay of no more than 0.1 seconds.

When designing the burner it was taken into account that the length of the flame should be no more than 1.5 m, and the nominal power of the heat flow should be no more than 2.5 MW.

The burner characteristics designed to simulate fire in the firing modules are:

- Nominal thermal power – 0,2 MW;
- Fuel type – diesel, furnace;
- Excess air ratio – not more than 1.15;
- Fuel pressure after the pump –1 MPa;
- Air pressure before the head – 1 KPa;
- Flame length at nominal power – no more than 1.15 m;
- Time of protective switching-off – no more than 2 seconds;
- Voltage power supply – 220 V;
- Recommended flow rate of liquid fuel in the modes are: the "Small Fire" – 10.2 l/h, the "Moderate Fire" – 16.0 l/h, the "Big Fire" – 26.2 l/h.

The burner unit is presented in Fig.2. The fan blows air into the head with the required flow rate. Liquid fuel is sucked by the pump through the filter and supplied under pressure through the valve into the spray unit, where the fuel is sprayed in the expanding cone at the angle of 60° into fine droplets. The aerosol mixture, formed in the head of burner, is ignited by a spark in the ignition electrode using the ignition transformer.



1 – frame; 2, 3 – flanges; 4 – fan; 5 – flame holder; 6 – gas flow divider; 7, 8 – nozzles; 9 – pipes of the fuel line; 10, 11 – solenoid valves; 12 – ignition transformer; 13 – ignition electrode.

Fig.2 - Burner unit

The flame turning-off in the training simulators occurs in the following cases:

- When the limit values of controlled parameters are reached;
- When the controlled flame is quenched;
- In the absence of electricity.

The flaming burn termination during the training can occur in the automatic mode, when only the preset drop of the temperature or the extinguishing substances is achieved.

There is also a possibility to disable the flaming burning after visual assessment by instructor or if he deems that the trainees operate correctly.

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UDC 159.9:614.8

DEVELOPMENT OF MEDIA COMPETENCE OF STUDENTS BY MEANS OF SOCIAL-PSYCHOLOGICAL TRAINING

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In the modern society mass media turned to be a powerful factor influencing the world view of both an individual person and social groups. Media competence became a qualification that a professional in any sphere absolutely must have. Only media competent person is able to be conversant in information flows, to understand, assess, interpret the information and thus to perform his/her professional duties in a quality manner. However, media competence is not limited to the given ability. Mass media is only intermedia for transfer of information. Any information always has a primary source. Nearly always a journalist gets reliable information from an official source. Hence, media competence comprises skills in creation and transfer of information to a large audience by means of media also. Therefore for the purpose of this article media competence should be understood as a set of personal motivations, experiences, and abilities allowing to select, implement, assess, **create and transfer** the information of any type, form, and style via the mass media, and to analyze complicated processes of media functioning in the modern society also [6].

It is hard to imagine professional activity of a modern head of emergency department without need to intercommunicate with mass media. Significance of such type of intercommunication increases greatly during coverage of emergency situations. A rush statement made by a representative of the Ministry for Emergency Situations can cause irreversible effect. Such effects are rumors

propagating among population due to ambiguity of the “official” information, panic in the emergency zone, and loss of confidence in MES officers.

Based on the abovementioned, development of media competence is one of the goals of the modern heads of emergency department training [7].

During development of training course special attention was given to selection of training form, because education and development of adults differs from the educational scenarios for younger students significantly. At current stage of development of the national educational system previous paradigm "education for the whole life" was replaced by a new paradigm – “education during the whole life”. An attempt to implement the traditional educational methods within the framework of the new paradigm revealed its inefficiency in relation to adult students [4]. This has pushed the creation of new educational models and programs for “already trained” groups. Obviousness of fast obsolescence of skills received some time ago played a role of no little significance in this process.

Rethinking of training system for students – heads of emergency departments – allowed having new sight of effectiveness and content of specific forms and methods of the heads training. In particular, such form of education for “already trained” professionals as social-psychological training with many form variations is widely used nowadays.

Large number of researches of both foreign and domestic scientists give evidence of the fact that learning of training material by adult students depends on many factors: form of study, professional features of a lecturer, motivation, personal characteristics of students and of a lecturer and etc. [1; 2]. A great deal of researches is devoted to study of training effectiveness [2–5]. Accumulated material in the field of assessment of social-psychological training strongly demonstrates effectiveness of this form of study.

Our own researches showed that effectiveness of a social-psychological training depends on the content of training program also. Specifically, in the course of creation of communicatory training programs a trainer ought to take into account the fact that the higher the initial level of training subject knowledge of the students the better they learn the training material.

Within the framework of solution of task on student's media competence development a special training course "Technology of Effective Communication" was developed. The fact that all modules in the course refer to communicatory subject by their content was taken into consideration during creation of the course. Accordingly, a theoretic unit necessarily precedes each training. The theory is accompanied by many case stories of emergency departments' activity.

Practical training on media competence development is realized in the form of social-psychological training and is held at the educational press-centre of The State Educational Establishment "Institute for Command Engineers" of the Ministry for Emergency Situations of the Republic of Belarus. Training is organized in the form of dynamic within-group interaction with video feedback. During the within-group interaction trainees practice situations which can take place in their professional activity. Thus according to the training program on "Technology of Efficient Communication" development of media competence of the heads of emergency departments is provided within several units: fundamentals of nonverbal communications, personal public style of an executive, negotiating techniques, preparation of report from the emergency zone, preparation and holding of press-conference (briefing). Practicing of all components provided for by the training program is accompanied by video shooting. After exercises, cases, business and role-playing games are finished, the video record is analyzed. The trainer participates directly in the video record analysis and emphasizes both the achievements and individual features of interaction which has to be better worked at.

Essential condition of a training effectiveness is its maximum correspondence to the current operational environment in the Republic. For the purpose of fulfillment of this condition all cases and business and role-playing games scenarios are developed on the basis of actual reports of Operations Control Centers of the Ministry for Emergency Situations.

Implementation of a social-psychological training as a form of education allowed not only to increase effectiveness of studies but to solve the task on development of media competence of students also. Having completed the training course, the heads of emergency departments are not only acquire knowledge in the field of effective use of mass-communication tool for solving of professional tasks, but gain confidence in the situation when they have interviews with journalists, being a significant part of their professional activity.

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SOFTWARE TRAINING IN THE FIELD OF FIRE INVESTIGATION FOR PREPARING OF HIGHLY QUALIFIED SPECIALISTS

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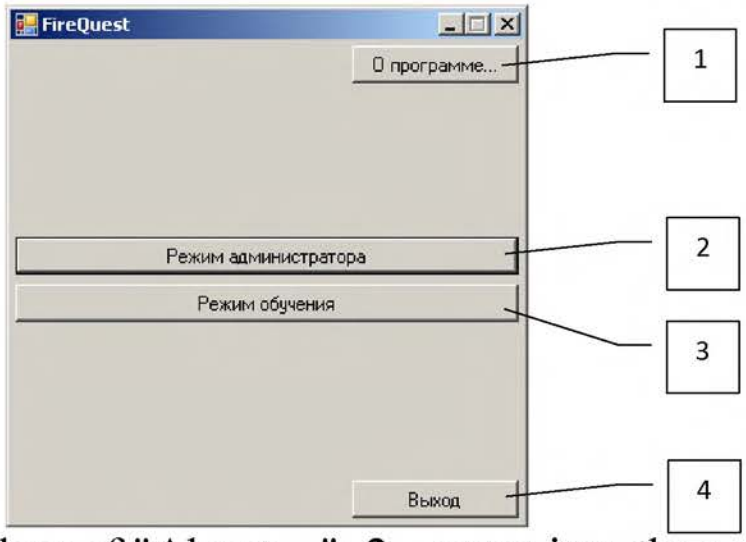
The program complex in the field of fire investigation has developed by the specialists of the Institute for Command Engineers to improve the process of preparing the specialists in the field of state fire supervision.

The purpose of software development is to model the situation prevailing at the site after the fire and to carry out the preliminary check of fire circumstances. Also, the goal of this development is determined by undertake urgent investigative actions in inspection of the scene, confiscation, packaging and the direction of evidence for the examination.

The software has two functional modes are displayed in the main window (fig.1).



1 – open the window of "About ..."; 2 – entry into the mode of administration; 3-input in the learning mode;
4 - completion the application

Fig.1 - The main window

The program interface is ergonomic, intuitive (fig.2). Navigation is carried out with the mouse.

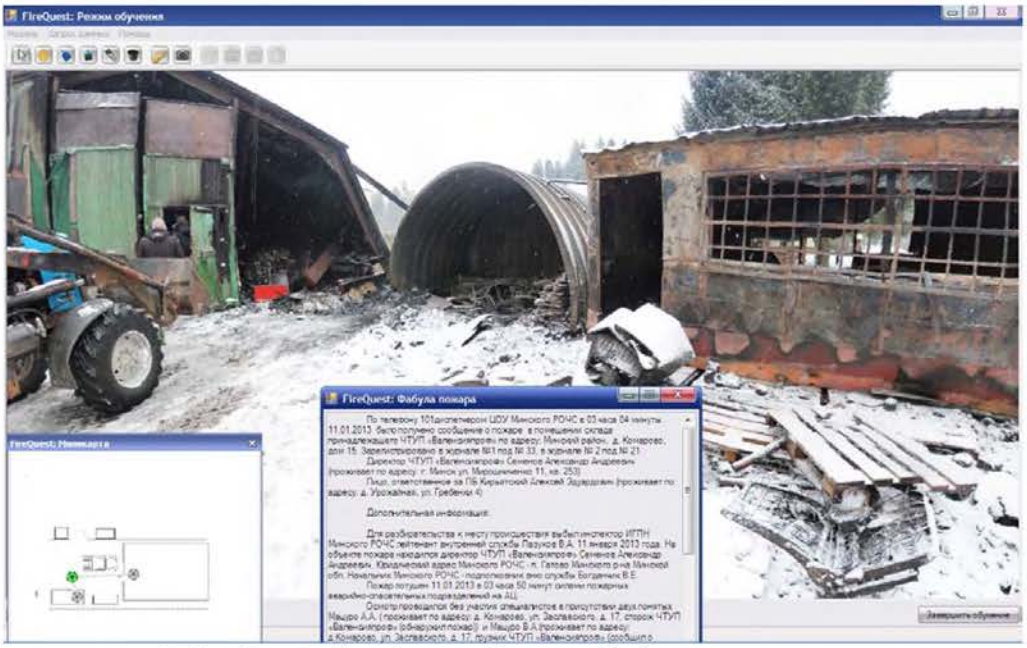


Fig.2 - The interface of the program

The illusion of three-dimensional images is formed through the recruitment of panoramic photographs taken from the same point of the 3D space. The mouse wheel is for zoom in and out of the camera (fig.3). A transition to a new point shot another panorama is done by pointing the mouse at other points 3D space and clicking the left mouse button.

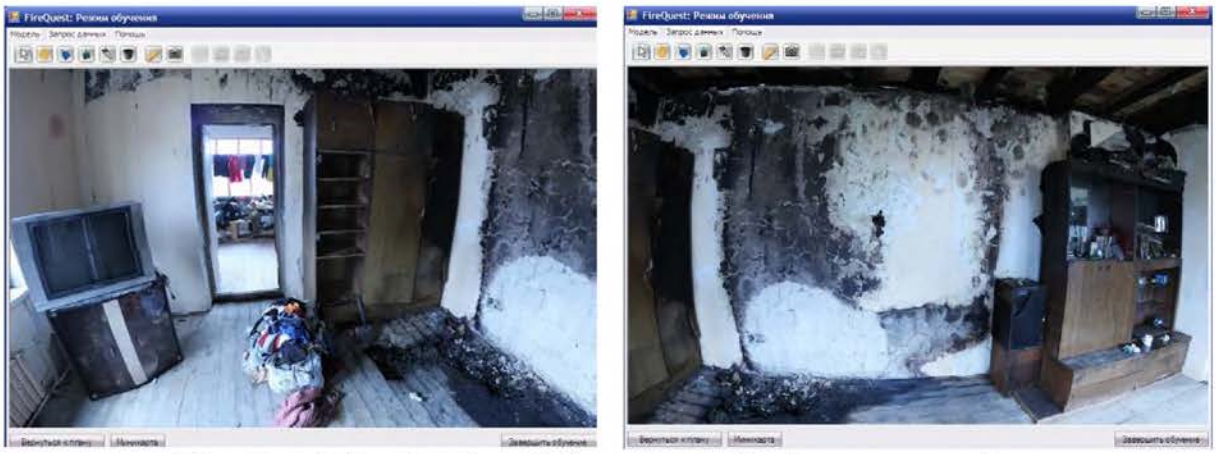


Fig.3 – The look of the room in 2 perspectives

The desired tool for the removal of evidence is selected by user from the toolbar. Then the object is deleted by pressing the left mouse button on it and the desired packaging material is confirmed by the same way. After removal of the object area

under it changes color (turns white). Converting objects made automatically to the appropriate procedural document.

User has the ability to fill the relevant documents in the course of the proceedings which are exported to Word by user command (fig.4).

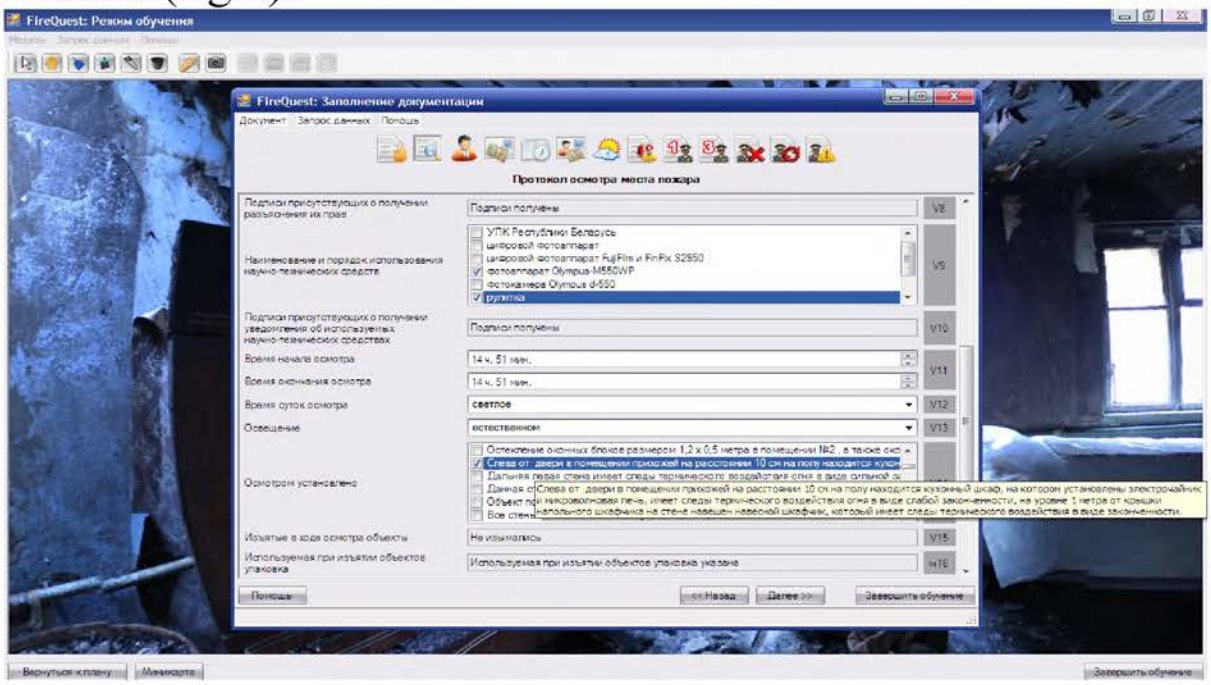


Fig.4 - Filling out documents

The results of user experience are evaluated by means of charging (-1 ball) for improper action rating items with a 10-ball system. Software supports with operating systems such as Windows, namely: Windows XP, Windows Vista, Windows 7, designed for installation on your PC such as IBM with the following minimal configuration: CPU frequency of 1600 MHz ... 2500, 1024 ... 2048 Mb RAM, 1 GB available hard disk space 512 ... 1024 Mb memory video card (GeForce 5600 video card type), a monitor with a screen resolution of 1280x1024, keyboard, mouse.

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FIRE DANGER INDICES OF MAGNESITE SLABS

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Regardless of the composition and manufacture method all building materials must have satisfactory fire danger indices [1], because the sphere of their use in construction depends on the accuracy of their determination.

Magnesite plates are not a novelty at the construction market of Ukraine and for the last 5 years their application in construction has grown significantly. First research of magnesite slab combustibility were conducted by the Ukrainian Scientific and Research Institute of Fire Safety of Ministry of Emergencies of Ukraine in 2007 [2]. According to the testing report, magnesite slabs were recognized as non-combustible material for use in industrial and civil construction. Technical certificate [3], which indicates fire danger indices of magnesite slabs, is void today, so there is a necessity of their determination, since their composition and percentage of combustible fillers in them over the last years might have been changed.

Today magnesite slabs have broad scope of use in construction for coating, flooring, building light partitions, etc. In particular, magnesite slabs can be used as a fireproof layer, therefore, requirements of normative documents to fireproof materials must be taken into account: materials must be non-combustible, must not spread flame on the surface, must have low smoke forming ability, etc. [1].

The main idea of this investigation is determination of fire danger indices of magnesite slabs (combustibility, flammability, flame spread, smoke forming ability groups) by complex testing methods according to current State Standards of Ukraine [4, 5, 6, 7].

Summary of main research material

Determination of combustibility group by method 1. Tests determining combustibility of the material were carried out according to the method [4]. First testing was conducted by the method I, which is intended to rate the material as combustible or non-combustible material group. For that reason five experimental samples with a diameter of 45 ± 2 mm and a height of 50 ± 3 mm were prepared. All samples were conditioned at temperature of 60 °C ± 2 for twenty four hours and weighed.

Building materials are referred to as noncombustible according to such combustibility parameter values:

- temperature increase in the stove is not more than 50 °C;
- sample mass loss – less than 50%;
- duration of stable flame combustion – not more than 10 seconds.

Average temperature difference in the stove during testing was 1,4 °C, on the sample surface – 4,4 °C, inside the sample – 44 °C. After final weighing of samples, it was found that the average weight loss was 36,9%.

Determination of combustibility group of magnesite slabs by method II. To confirm testing results according to the described methodology, samples of magnesite slabs were tested in the fire chamber, which is designed to determine combustibility group of building materials [4]. For the test 12 samples with length of 1000 mm and width of 190 mm were prepared.

For testing the fire chamber was used, according to [4], which consists of a metal box, propane – butane mixture feeding system, complex of measuring devices, ventilation system.

Having finished the tests, it was determined that experimental samples supported no combustion nor were damaged by flame impact. Repeated weighing showed that the permissible weight loss of each sample was less than 20% [4].

On the basis of combustibility testing results obtained by two methods, we can conclude that magnesite slabs are non-combustible.

Determination of flammability group of magnesite slabs. The next research stage was flammability testing of magnesite slabs. Tests were carried out according to the method described in [5]. According to this method 15 experimental square samples with 165 mm side length and 10 mm thickness were prepared before testing. Prior to testing all experimental samples were conditioned for twenty for hours at temperature of 22 ± 2 °C.

According to the test results magnesite slabs should be referred to B1 flammability group (difficult to ignite), according to the classification established by [5].

Determination of flame spreading group. Determination of flame spreading group was conducted by the method approved by [6]. For the test 5 samples of magnesite slabs sized 1100 × 250 mm were prepared. According to the approved methodology [4] samples are necessarily conditioned at temperature of 20 ± 2°C and relative humidity of 65 ± 5% for about 72 hours.

During testing of each sample, the surface did not ignite. According to the method [6], in the absence of sample ignition test stopped.

According to testing results of magnesite slabs on flame spreading, it can be concluded that magnesite slabs do not spread flame over the surface and belong to group of RP1 (not spreading flame on the surface), according to the accepted classification [1, 6].

Determination of a group by smoke forming ability. The final stage of magnesite slabs testing for fire hazard indices was testing of smoke forming ability. According to the method of experimental determination of the smoke forming coefficient of solids and materials [7], 10 samples with dimensions of 40 × 40 mm were prepared to conduct testing and were conditioned at relative humidity of 50% and temperature of 22 ± 2 ° C for 48 hours.

Smoke coefficient in combustion mode is 1,36 m^2/kg, in smoldering mode – 0,98 m^2/kg. Therefore, according to 2.14.2 GOST 12.1.044-89, material samples are classified as "a material

with low smoke forming ability" D1 group (low smoke forming ability), the maximum value for which is 50 m^2/kg.

Toxicity of magnesite slabs. Determination of toxicity material group is important information in determining scope of use of this or another building material.

Toxicity tests of magnesite slabs were not carried out due to limited abilities of research laboratory of Lviv State University of Life Safety. Despite this, toxicity level of the building material can be described by analyzing its chemical composition and carrying out an analysis of existing conformity certificates [3, 8]. According to [3] magnesite slabs belong to T2 toxicity group (moderately hazardous). This index may be based upon the presence of a small amount of technical admixtures and adhesives used in the manufacture of magnesite slabs.

The main components of magnesite are magnesium oxide (MgO), magnesium chloride ($MgCl_2$), perlite, wood shavings and fiberglass. All of these components are not dangerous or toxic.

Thus, on the basis of performed analysis of investigation, of magnesite slabs' composites, and areas of their application, we can conclude that toxicity of magnesite slabs is minimal.

Conclusions. The analysis of the literature and set of our experimental tests revealed that magnesite slabs have the following fire danger indices: NG (noncombustible material), B1 (difficult to ignite), RP1 (not spreading flame on the surface), D1 (low smoke forming ability) and T2 (moderately hazardous) [1] and can be used as fireproof material for building structures.

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USE OF MODERN SOFTWARE IN TRAINING OF FIRE FIGHTING HEAD

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Modern life is characterized by the presence of the risk of accidents, man-made and natural disasters. Despite the positive changes in the activities of the Ministry for emergency situations in prevention and elimination of emergency situations and reduction of firedamages, the number of victims remains high.

In preparation of the firefighting head role plays have being used for many years as one of the basic and important form of tactical training of commanding staff. The use of such plays in preparation for specialist in the field of emergency elimination is one of the most effective ways of modeling professional activity of experts of the MES. In the Institute for Command Engineers of the Ministry of Emergency Situations of the Republic of Belarus specially designed software systems are used during simulation games in the field of the organization of firefighting at various economy objects (fig.1).

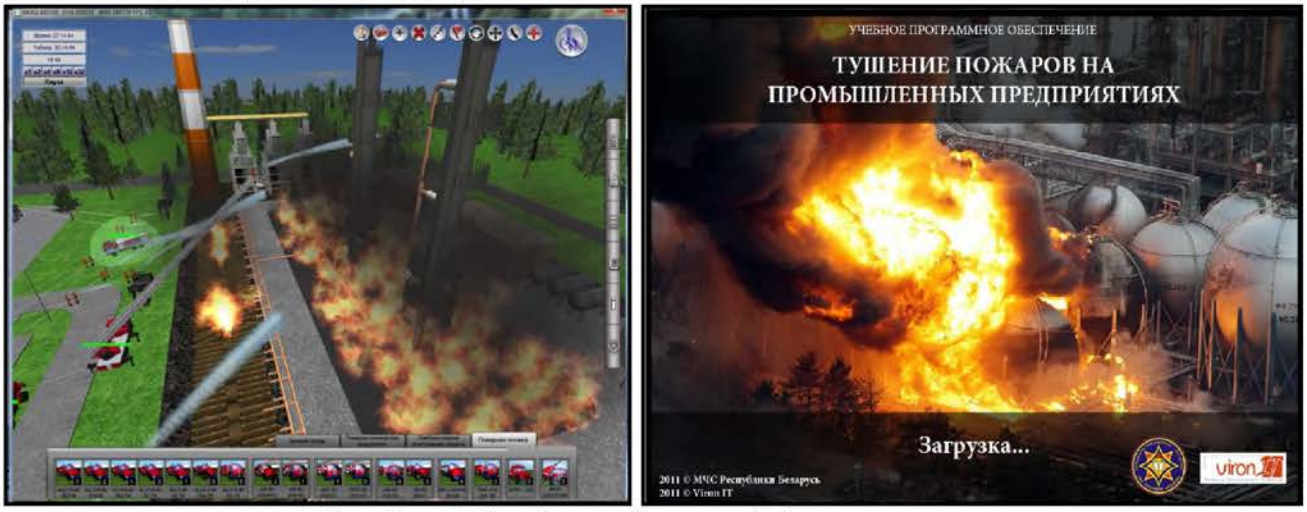

Fig.1 – The interface of the program

The aim of such programs is improving the efficiency of process of training as of the units engaged in fire suppression at

industrial enterprises, as well as of commanding officers managing the activity of rescue units. This is achieved through the introduction of innovative educational technologies implemented in learning training programs, which allow automation of learning process.

The object simulated in the "Software system for extinguishing fires at an industrial enterprise" is aproduction plant for manufacturing of metal parts. This object includes: building of assembly workshop, building of warehouse for paints, building of warehouse of finished products, building of workshop for mechanical metal treatment, boiler house with a compressor, outdoor power switchgear, and outdoor metal storage. For all of these placesare created several scenarios of possible location of fire.

The user can repeatedly play the role of the head of fire extinguishing, work out the elements and techniques of fighting in different situations; and in network version of the program it is possible to work out actions of various officials: for example, head of fire extinguishing, chief of staff, chief of logistics, chiefs of fire sections, and dispatcher of operational control center (Fig.2).

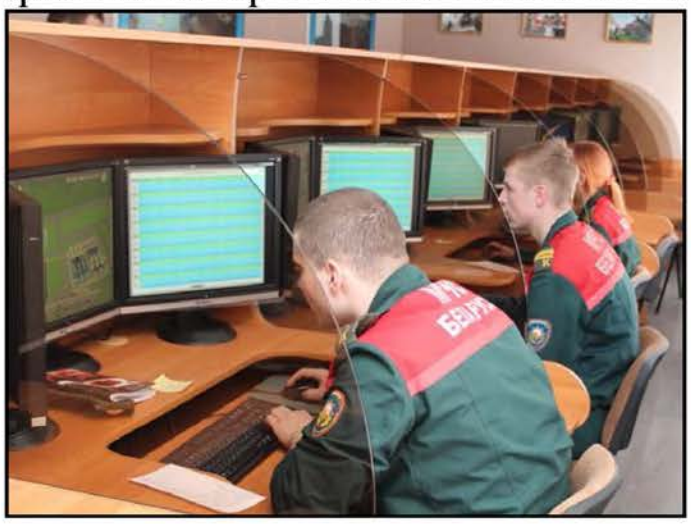

Fig.2 – The training of fire fighting head

The experience of training with the use of such software products shows that the student is easy to grasp and understand the processes occurring during firefighting or emergency elimination. The trainee is able to learn how to act as anofficial of the operational headquarters for emergency elimination, how properly maintain radio communication, and control the subordinate units.

UDC [54:37.091.315.7]:614.8

PROFESSIONALLY FOCUSED TEACHING CHEMISTRY TO CADETS OF THE MINISTRY OF EMERGENCY MEASURES

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A sufficiently long period of time, in many countries, there common problems and trends in the training of engineers in high school are observing [1]. The most important of them - a low level of basic education of students in chemistry and a lack of motivation to study a specific subject, requires a large amount of factual knowledge. The systematic tendency to devalue of scientific knowledge and practical skills in a real application of this knowledge in the public consciousness is observers [2]. This fact cannot be reflected in the specific, content and methods of implementation of chemical education in technical universities. For example, in some Eastern European countries the most stripped-down adaptation of the narrow course of chemistry in relation to their future profession is take place: only a short special course without studying the traditional classical sections of general chemistry [1].

This trend is the reduction and simplification of the content chemistry course seems to us inappropriate and dangerous for teaching future officers-rescuers. Because chemistry is one of the basic fundamental scientific disciplines, describing the structure of matter and the laws of its transformation, just it has an important role in the formation of engineer scientific thinking. Large-scale scientific thinking is especially important for emergency engineers, since their activities are constantly faced with the problems of safe function of production facilities, emergency response and disaster involving a large number of different

chemical substances. A rescue officer must be able to establish a cause-effect relationship in real life situations, which requires a considerable supply of basic scientific knowledge and the ability to analyze and synthesize new knowledge, internal readiness and ability to continually self-training [3, 4].

The upbringing of solid logical thinking is a serious problem not only in chemical education, but also in the whole block of natural sciences. The optimal solution in the study of chemistry by cadets of the Ministry of Emergency is a combination in education programs a few content components: general education, necessary to any literate person under industrial society, ecological, address safety for the society environment; and profile, adapted to the future engineer specialty.

During the theoretical material selection it needed for careful structuring by principle of practical relevance to the specialty, without prejudice to the formation by the cadets a complete picture of the material world. On the one hand, the future military engineers needs enough specialized knowledge of the chemical; on the other - this knowledge cannot be understood and internalized by the students without the study general theoretical postulates about the structure of matter, thermodynamics and kinetics of chemical reactions, the laws of electrochemical systems, properties of different classes of chemical compounds and etc.

In this regard, in order to adapt course of general chemistry for military engineering specialty, the most efficient seems to us the inclusion in a standard course the blocks of specific information. According to our observations, significantly improve the perception of the material and the interest to the subject given in lectures the specific examples of situations, which students may encounter in their professional work and daily life. In particular, this concerns the properties of corrosive and toxic substances, their physiological action and security measures, the characteristics of the chemical industries of our Republic and the likelihood of accidents involving dangerous substances.

The second important point in the training of engineers to the Rescue is a competent selection of calculation tasks and exercises for each of the theoretical sections. Practical tasks actively contribute to the understanding and assimilation of the material and instill skills of the critical thinking, develop the ability to form an own opinion and properly express it. Especial useful means of methodical preparation are represented by so-called practice-oriented case tasks [5], the conditions of which simulate real situations alleged professional activities, and to resolve them students needs the specific subject knowledge. The solving of the chemistry tasks demands the logical analysis of the processes, occurring in the system before making payment; assess the qualitative and quantitative changes of substances; that conscious consideration of the essence of things. Case tasks, in our experience, are very useful for formation the skill of analysis real systems, and as a very clear illustration for teacher the gaps in the knowledge of students.

Maximal using of the practice-adapted tasks, which use classical formulas and algorithms of solutions, allows to overcome the barrier of conscious mastery of the material; the students see the connection of chemistry with other subjects, particularly in physics and mathematics, which contributes to a unified picture of the material world. The understanding Physical meaning of many concepts and constants comes to cadets: such as activation energy of a chemical reaction, reaction rate constant, the activity coefficient of the ions in solution.

Also, it is very important to preserve in the specialized abbreviated programs the laboratory works, which forms to the students the specific practical skills for dealing with a variety of materials, equipment and device, that cannot be obtained in the performance of virtual labs. According to our observations, in recent years, high school graduates have no basic practical skills, such as: to measure sample of the substance or liquid, prepare the solution of desired concentration, build a simple heater devices,

etc. Moreover, how many of the students hold a pen or pencil and cannot enough quickly write for a long time, can be an indication of problems with the development of fine motor skills of hands (in healthy people), which has an impact on the development of thinking. Thus, the roots of the problem are drawn in primary school and are related both to the lack of opportunities for individual work with students, and with the rapid development the information technologies and its active implementation to the educational process, including in cases where it is justified. For example, as in the training of sportsman real workout in the gym cannot be replaced by virtual simulators, so in chemical education of lifeguards a lot of the practical skills in the chemical field cannot be accessed by computer models and educational films.

Cadets of engineering graduates studying chemistry at most one or two semesters in a very abbreviated form as a non-core subject, a lot of the students initially been skeptical, have low motivation to studying chemistry, lack of belief in the need of chemical knowledge, and the complete lack of skills to doing anything by own hands. While these skills are desperately needed to the lifeguard in the future to ensure their own safety and to maximize the efficacy of recovery people in the disaster zone, as in today's society, almost any disaster or a man-made fire are technological, involving hazardous chemicals.

According to our observations, for cadets of the Ministry of Emergency even simple experiments, performed own (such as recovery of potassium permanganate in various medias to produce different colored products, the reaction of "silver mirror" or checking the properties of ethylene, obtained by ethanol dehydration – color of the flame, discoloration of bromine water and Wagner reaction) is much more significant for the comprehension and memorization of the studied material than the same information in lectures and computer presentations. Even very simple laboratory work – such as the electrolysis of solutions of various salts to produce colored products or gases –

significantly increase interest of students to the subject of chemistry and activity in the classroom, and is also very useful in the development of the ability to build a logical line of reasoning: observation - the reason - consequence - a conclusion.

In addition, during the laboratory works (in process of assembly the device, mixing substances, heating the solutions, etc.) the students shake of the fear of direct contact with the chemical systems, develop practical skills for using equipment, accuracy and agility of movement, aware the methods of the safe operation with various substances. In the process of these tasks doing, not only a better perception and memorization of knowledge is happening, but also, which most important for the rescue engineer, observation and logic foreknowledge of events and a quick self-acceptance right decision are develop. Therefore, it seems desirable to extend the list of laboratory works in the study program for cadets of the Ministry of Emergency, as well as the development of several types of individual and group assignments for each topic.

Thus, the study of chemistry course cadets of the Ministry of Emergency, first of all it is necessary to develop the systematic logical thinking by cadets, the ability to analyze and draw conclusions, independently find the missing information, which is a common requirement for all nature scientific disciplines. Very important are the professional orientation the taught course and the ability to operate the acquired knowledge in solving practical problems with involving certain chemical substances, the ability to correctly assess in complex the processes occurring in the system and their possible consequences. However, practically-oriented adaptation of classical chemistry course should not distort the fundamental theory "skeleton" of discipline, without which the assimilation of knowledge become highly specialized units are not clear, and fall out of the synergistic understanding the structure and evolution laws of the world.

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