AVIATION SEARCH AND RESCUE PERSONNEL TRAINING BY THE MEANS OF THE INFORMATION EDUCATIONAL ENVIRONMENT OF THE ESTABLISHMENT OF POSTGRADUATE EDUCATION

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Abstract: The authors consider the problem of personnel training to improve the efficiency of search and rescue operations. Under challenging conditions of an aviation accident, the success of rescuing and surviving the victims depends on the professional readiness of these coordination centers and specialists. In the course of the research, it was found that this situation is due to the lack of a unified and standardized approach to forming training programs for aviation search and rescue personnel on a single object – an airplane in suffering distress. Therefore, the unification of educational programs and the certification process has become one of its primary functions. And for the system of professional development, the search for the ways to ensure the continuity of this process is actualized, which is possible only under the conditions of creation and implementation of a systemically organized information educational environment of the establishment of postgraduate education. At the Institute of Public Administration and Research in Civil Protection, such an environment functions on the LMS MOODLE platform. Its methodological basis is represented by a system approach that allows identifying the main functional elements; to model and describe the processes of each component and the functional relationships between them. Innovative author's technology is introduced in which classes are organized and conducted regardless of institutional forms (full-time, part-time, distance) both in computer-equipped classrooms of the educational establishment and for independent work in a remote mode outside of it.

Keywords: Civil protection, Education, Information educational environment, Innovative didactics, Postgraduate education, State aviation

1 Introduction

1.1 Statement of the Problem

According to the National Bureau of Civil Aviation Investigations for the period of 2015 - 2018 the relative rate of flight safety have deteriorated although 2019 showed positive trends in improving rate in this area [1, p.46, 2, p.5]. Given the statistics presented in these reports it is clear that one of the priorities of public authorities at various levels is to improve the efficiency of aviation search and rescue (ASAR) especially in the context of staff training. At the same time the analysis of a number of search and rescue operations carried out in the event of aviation accidents (AA) showed that the search and rescue services do not always find the place where the aviation accident occurred quickly enough so the decision is not taken timely and confidently at the scene of rescue operations; the AARO are often carried out unprofessionally not clearly organized interaction between the governing bodies of the forces involved in aviation search and rescue as well as units carrying out the SARO.

In order to specify the shortcomings in the training of personnel in all management bodies of air search and rescue the authors of the article created an information base of computerized situational procedures on the list of functions defined in Section 3 (p. 2) of the Rules of air search and rescue in Ukraine (Order of the Ministry of Internal Affairs of Ukraine dated March 16, 2015 № 279).

According to the list of these procedures they were experimentally tested at specially organized trainings with the staff of the Main Aviation Search and Rescue Coordination Center (MASARCC) and with four aviation auxiliary search and rescue centers (AASARC), aerodrome management bodies and operational coordination centers of the Main Departments (Departments) of the major State Emergency Service administration in the regions.

According to the results of the experiment conducted by the authors of the article and using the method of assessing of the competence level [6], an integrated rate of professional competence in performing the functions defined by each category of staff which activities are somehow related to aviation search and rescue (ASAR) and direct SARO was determined analytically. Based on the obtained results nomogram showing the level of functional competence of each category of respondents was constructed (Figure 1).

Assessment of professional competence was carried out according to the following four criteria:

1. The ability to plan, organize and conduct activities with ASAR within the given competencies using appropriate search and rescue technologies.
2. The ability to create safe under the acceptable risk conditions of the SARO participants.
3. The ability to continuous professional development, self-esteem and reflection.
4. The ability to model the behavior of participants in terms of SARO and establish their partnership.

Although the represented below nomogram cannot be considered correctly enough for the small number of respondents who participated in the experimental studies the validity of the experimentally obtained conclusions is confirmed by the results of the current inspection conducted in 2019 by the Aviation Search and Rescue Department of SES as for the readiness to quick respond to aviation emergencies.

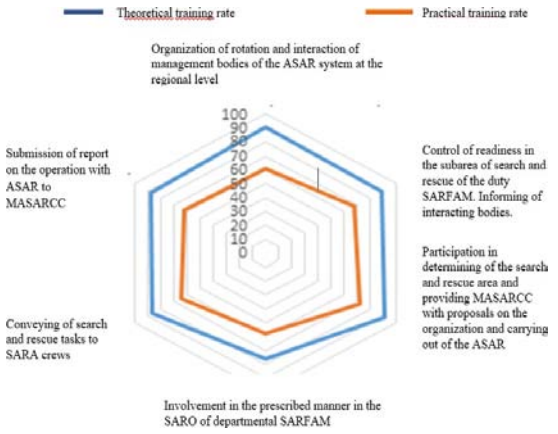

Figure 1 – An example of a competence level staff nomogram which is involved in aviation search and rescue operation

As a result of such an integrated approach to the definition of evaluation indicators the following trends have been identified:

1. Specialists in the field of aviation search and rescue have a fairly high (satisfactory) level of theoretical training which is in the range of 75 - 85 points. At the same time there is a statistically significant gap in the indicators of practical training of personnel of the ASAR system in the context of transformation of theoretical knowledge in the practical development of situational procedures related to the aviation event and is in the range of 51-65 points.
2. Although the object of aviation search and rescue for all participants in search and rescue operations is the crashed airplane the content of their training, retraining and advanced training is determined by training programs that differ significantly in content, forms and types. That is

approaches to unification and standardization of the educational process are not implemented.

The imbalance of curricula in the context of the ratio of fundamental and applied training, ignoring the possibilities of optimizing their content on the basis of methods of unification as well as the imbalance of forms and types of theoretical and practical training that allow to define the object and subject of research and to formulate the goal was detected.

Thus the object of this study is the system of aviation search and rescue personnel training and the subject of the study – theoretical-methodological and organizational basis for training of personnel of the State Aviation Administration of Ukraine on the basis of unification of the content of educational training, optimization of forms and types of classes.

The purpose of this study is to substantiate the need to improve the training of specialists of state aviation of Ukraine (SES, Armed Forces of Ukraine, National Guard, National Police, State Border Service) involved in the operation of aviation search and rescue on the basis of innovative organizational and pedagogical concepts and domestic and foreign experience in the unification of educational and certification processes in the information and educational environment of the establishment of postgraduate education.

1.2 Analysis of Recent Research and Publications

Problems of reliability of the air search and rescue system are constantly at the center of domestic and foreign research. The training of search and rescue specialists as one of the main components of the efficiency of this system is deeply revealed in the studies of F. Nilson, K.V. Surkova, Ya.S. Mandryk [18]. Professionally important qualities of rescuers are reflected in the works of V. Maryschuk, O. Dyshkant [8, 13]. Organizational aspects of search and rescue flights in aviation are considered in the works of O. Sobolev, V. Popov, A. Selezniov and others [17]. Medical and medical- psychological bases in the field of search and rescue were analyzed by P. Voliansky, A. Makarenko, N. Drozdenko, S. Striuk and M. Dolgyi [12].

The leaders of world education in the context of aviation training are the United States and the United Kingdom. Research of professional training of future specialists of different specialties in the USA on the basis of comparative pedagogy was conducted by domestic scientists Ya. Belmaz, N. Bidiuk, O. Dubovyk, O. Romanovska [8, 18, 19].

An important aspect of professional development is the development of the cognitive component i.e.: intelligence and motivation which affect the effectiveness of professional competence and which are manifested in the operationalization of educational achievements [13]. The effectiveness of the use of blended learning and learning based on practical experience in the system of higher education is emphasized by K.E. Holbray [5], M. Cavanagh [6], Alex G. Fegely, Heather N. Hagan and George H. Warriner III [9].

The generalized conclusions of the research results of these scientists show that at the current stage of reform among the key areas of training should be modernization, integration, differentiation of training content, informatization, individualization and implementation of modern approaches and innovative methods. The most common in the system of higher and postgraduate education is a model of learning based on practical experience (experiential learning theory model).

Rethinking of the traditional training system actualizes the search for various factors to improve professional education in the field of "Civil Protection" on the mentioned above issues of advanced personnel training of state aviation entities in the context of aviation search and rescue.

2 Materials and Methods

The research was carried out in terms of the scientific paper "The Concept of Training, Retraining and Advanced Training of Search and Rescue Personnel of the State Aviation of Ukraine on the Basis of Unification of the Educational and Certification Process." During the study the general scientific methods (analysis, synthesis, comparison, generalization) for studying the theoretical sources develop methodological principles of research, build its conceptual and categorical framework and specific scientific (comparative analysis – to study socio-pedagogical, philosophical, sociological, technical literature, analysis of leading documents of international organizations and synthesis of provisions relevant to the topic of research) were used.

3 Results

The current state of search and rescue support of state aviation of Ukraine requires qualitatively new approaches to training, retraining in general and in particular, advanced training of specialists of coordination centers of aviation search and rescue as well as the rescue specialists to eliminate the consequences of an aviation accident.

In our opinion it will not be superfluous to conduct a more in-depth study of the experience of the world's leading countries such as the United States and Europe where there is an ongoing process of improving the training of aviation professionals.

The requirements to the training of aviation search and rescue specialists in the United States are implemented through a system of flight schools which are required to document the training course and conduct practical exercises with a license from the Federal Aviation Administration. This approach makes it possible to certify each specialist involved in the RDP and issue them qualification certificates of the appropriate class qualification for a specific group of aircraft to which a specialist may be allowed to conduct aviation rescue operations. Theoretical exam is an important aspect of professional training which is conducted in special authorized test centers. Computer-based tests are used to assess the theoretical knowledge. An ordered system of computer technology helps to increase the efficiency of learning and expands the possibilities of presenting various types of dynamic educational video, audio and animation information. The volume of test questions has about 600 situational procedures close to real conditions.

Among European countries the United Kingdom is actively takes measures to improve the quality of training the air search and rescue personnel. The practical implementation of personnel training tasks is entrusted to specialized educational establishments. The peculiarity of this type of training is that only those who obtained the higher education before are submitted to training. Depending on the professional area the specialist after passing the theoretical exams receives a certificate or a national license with the right to perform aviation rescue operations. In general the training of aviation specialists is based on the latest advances in science and technology. The focus is on aviation safety and compliance with relevant instructions with mandatory periodic certification [13].

In the system of Norwegian specialists training to conduct SARO attention is focused on improving the processes of planning, organizing, coordinating and carrying out air search and rescue. Norway has used the great potential of both human and logistical resources for search and rescue so it provides effective search and rescue not only in its area of responsibility for the SARO but also in other countries such as Denmark, Finland, Estonia, Sweden, Iceland, Greenland, Faroe Islands. Norwegian training of search and rescue specialists is carried out in accordance with the requirements of international aviation organizations while constantly accumulating world best practices in education adapting it to the needs of their society [12]. The concept of the Norwegian search and rescue system is focused on the implementation of such elements as the legal framework, organizational structure, staffing and an effective system of

financial support. This conceptual basis for training standardizes the relevant operational procedures within the SARO partner countries. This guarantees the effective work of search and rescue personnel in the area of the event of an AA or other emergency.

The efficiency of SARO, the level of equipment of aviation search and rescue forces and the level of professional training in this country are maintained at a high level through systematic internships directly in the coordination centers of search and rescue of Budo Airport. This internship is based on the Crisis Emergency Response Center located at Wideroe. This center simulates possible aviation events against which the issues of organization, planning, coordination, conducting SARO and clarification of tasks are worked out. The training is carried out in one-year programs which consist of various modules such as aviation search and rescue, maritime search and rescue, the activities of the radio coast guard service, air navigation, etc. After passing the training program future professionals must pass a theoretical and practical test. The results of these tests determine the suitability of applicants to effectively carry out professional activities.

According to the results of the above mentioned pedagogical comparison and in the context of Ukraine's European integration the domestic system of training, retraining and advanced training of aviation search and rescue personnel clearly faces new challenges regarding the need to improve and transform it on the basis of advanced educational technologies such as modular-competence, meta-subjective and subject-activity approaches.

Modular-competence, meta-subjective and subject-activity approaches are keys to the modernization of vocational education in Ukraine which is why highlighting their main provisions in the context of improving the training, retraining and advanced training of aviation search and rescue specialists of all categories is an urgent need.

New accents in the issue of modular-competence approach in vocational education appeared in the mid-90 of the XX century in the context of the urgent need for its standardization and introduction of common European basic models of educational and professional training of highly qualified specialists. The main characteristics of the modular-competence model of education are not only the description of functions but also the description of the profession including the relationships and interdependencies in their process. The functional-process paradigm of the modular-competence approach in vocational training revealed its high manufacturability which is based on:

- Structuring of the vocational training content;
- Adherence to a strict sequence of presentation of all didactic elements of the educational model (hierarchy of goals, content, methods of managing cognitive activity) in the form of a software algorithm;
- Variability of structural personality-oriented organizational-pedagogical and didactic-psychological units.

The modular-competence approach involves the designing of professional training based on educational and professional guidelines, goals and content of future activities. And for this special attention should be paid to the correction of the educational process and its diagnostics. The structural components of the modular-competence approach are the following:

- Target installation;
- Meaningful component;
- Organizational component;
- Result of activity.

The main basis of the modular-competence approach is a modular educational-professional program based on professional competencies.

In combination with the competence approach meta-subjectivity acts as a principle of integration of the professional training content and as a way of forming theoretical thinking and universal ways of professional activity. If a specialist whose activities in future will be connected with the search and rescue work related to an aviation event is able to find the ways to perform his or her professional tasks on simulator models then the experience gained can be used by him or her in other cases if any kind of extreme situations occur. The learner masters the skills in order to identify a problem in a difficult situation and to suggest ways of solving it. This characterizes the process of acquiring competence through the meta-subject organization of professional training of future aviation rescuers.

Being based on the achievements of the world psychological and pedagogical science Ukrainian scientists of the late XX and the beginning of XXI century made a significant contribution to solving theoretical and methodological problems of the subject-activity approach. The modeling of the cognitive process with the implementation of the subject-activity approach is based on the didactic-psychological construction of interactive interpersonal cooperation of learners with those who teach against the background of the functioning of the object of cognition. In this case the organization of interpersonal interaction of educational entities should focus on theoretical and methodological aspects of modeling pedagogical situations, substantiating the criteria for assessing the level of readiness of students to perceive and work with proposed situations to be studied, and teachers - in the context of learning the content of such pedagogical subject-oriented activity situations.

From the mentioned above information it is obvious that the application of these approaches in the actual practice of training, retraining and advanced training with their traditional organization is associated with significant difficulties and with insufficient computerization (software and hardware components of this innovation process) makes it impossible. In addition it should be emphasized that declaring in educational standards the transition to modular-competence, meta-subject and subject-oriented activity approaches is insufficient and requires the development of scientifically sound close to real practice methods of their implementation along with a focus on widespread of using of process-functional capacities of information and communication technologies for modeling organizational-pedagogical and didactic-psychological processes for training specialists involved in search and rescue operations related to the aviation event. A real mechanism for implementing of these approaches can be a specially created at the Institute of Public Administration and Research in the field of Civil Protection professionally oriented informational educational environment built on the powerful didactic capabilities of hardware and software in combination with information and communication technologies.

The information educational environment of the educational establishment in the field of civil defense should be considered as a systemically organized electronic resource for educational activities regardless of didactic forms: full-time, part-time and distance which is carried out by providing remote access to obtaining of a certain set of knowledge, skills both in direct (classroom) and indirect (outside the classroom separated by time and space) interaction of the subjects of the educational process. This allows us to consider the information educational environment as an object and subject of the theory of synergetic systems. It is characterized by the ability to form a set of structural elements, the parameters of which are determined by their own properties and features of the organization of internal and external interaction within a single information educational space.

It should be noted that the information educational environment cannot be considered as a simple set of e-learning information or individual "private cloud information educational resources" that are chaotically scattered in our educational present. The educational activity of an educational establishment is first of all an organized, coordinated and controlled process. Its

methodological basis is a systematic approach that allows defining the main functional elements, modeling and describing the processes of each individual element as well as the functional correlation between them. Obviously no separate purpose-oriented web-technologies can solve this problem. Solving such complex of multifunctional system-forming tasks requires the development of special didactically oriented software and tool platforms. Such a platform at the Institute of Public Administration and Research in the field of civil protection is defined as a software and tool complex with open source MOODLE (modular object-oriented dynamic learning environment). The basic subsystems of this platform are: learning management (LMS), course management (CMS) and a virtual learning environment (VLE). On the basis of this platform the Department of Aviation Search and Rescue introduced an innovative author's technology of computer-oriented didactic design of information educational environment for the first time in which classes are organized and conducted regardless of institutional forms (full-time, part- time, distance) both in computer-equipped classrooms of the educational establishment and for independent work in remote mode outside it.

In a purely pragmatic view the modern educational process of training, retraining and advanced training of civil protection professionals is a set of artificially created emergencies and events. Against their background conditions that ensure the transfer and assimilation of educational information, accumulation of professional knowledge, formation of skills, abilities and competencies and at the same time the formation of personal qualities inherent in this integrated profession are created. Thus the practical experience of each subject becomes a source for further professional development. The importance of using this approach - practical learning (Experiential Learning) – emphasizes D.A. Kolb in his studies [7].

There are the following innovative technological components of the presented information concerning the educational environment:

- The possibility of use regardless of institutional forms of education (full-time, part-time, distance, network, individual);
- Use of unified organizational-pedagogical and didactic-psychological technologies for the formation of information educational environment;
- Integration of modular-competence, subject-activity and meta-subject approaches in the information educational environment (for the first time);
- Adaptation of electronic educational resources of the information educational environment to abilities, inquiries, interests and aptitudes of the person;
- Assessment of individual competence on the basis of proactive analytical approaches.

In our opinion the development of such an environment will correspond to the strategic direction of improving the education system and training in the field of civil protection and will strategically unite the efforts of scientific, pedagogical and engineering personnel to support the educational platform.

It should be noted that the possibility of using electronic resources regardless of institutional forms of education (full-time, part-time, distance, network, individual) today is becoming a topical issue regarding the universality of its design and teaching methods whether in class, extracurricular, online or offline coordinated or spaced in time. The content should be interactive and adaptable to the conditions of interaction of all subjects of the educational process. The above requirement focuses on the mandatory use of unified organizational, pedagogical and didactic-psychological approaches to the formation of information educational environment of the educational establishment in the context of its compatibility not only with computer software but also with the use of computer-based didactic design technologies.

We fully agree with the authors of the article [4] that the spread of information educational environment using LMS MOODLE in the educational institution requires targeted training of research and teaching staff particularly in the system of professional development.

4 Conclusion

In accordance with the Rules of Aviation Search and Rescue in Ukraine the State Emergency Service of Ukraine is responsible for organizing and training staff of the air search and rescue system (SES, Armed Forces of Ukraine, National Guard, National Police, State Border Guard Service) operating in as part of a single system of aviation search and rescue.

However the training of specialists of these agencies in Ukraine is not carried out centrally according to uniform programs and plans that must meet the requirements of domestic and international standards for aviation search and rescue. There is no certification procedure for personnel involved in search and rescue operations of aircraft in suffering distress.

1. The Department of Aviation and Aviation Search and Rescue has been established within the Institute of Public Administration and Research in Civil Defense. The level of theoretical training and practical experience of scientific and pedagogical staff of the department as well as methodological and logistical support of the educational process meet the requirements of domestic and international standards for the organization and training of specialists of all these subjects of state aviation.
2. The department has developed and tested new curricula based on unification of subject content and optimization of the ratio of theoretical and practical forms and types of classes on the basis of a special aviation team of the SES. Students successfully passed the certification for professional training programs and received a state certificate that meets the requirements of international standards.
3. The obtained theoretical results and their confirmation in practice showed: specialists involved in the organization of aviation search and rescue and coordination of forces and means of a single system of aviation search and rescue namely: the Armed Forces of Ukraine, National Guard, National Police and State Border Guard Service of Ukraine must be trained and upgraded centrally according to licensed educational and professional programs and certification in the State Emergency Service of Ukraine according to the regulatory procedure.
4. The Institute of Public Administration and Research in the Field of Civil Protection started the work aimed at the updating curricula in the context of the relationship between fundamental and applied training should be based on the principles of modular-competence, meta-subject and subject-activity approaches.
5. The information educational environment based on the LMS MOODLE platform which requires replenishment of electronic educational resources, tests, video lectures, etc. needs the further development.

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Primary Paper Section: A

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