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**MECHANISM OF DEVELOPING PROFESSIONAL COMPETENCE
MODEL FOR COMBAT MAINTENANCE
OF UNMANNED AIRCRAFT SYSTEM**

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**МЕХАНІЗМ РОЗРОБЛЕННЯ МОДЕЛІ ПРОФЕСІЙНИХ КОМПЕТЕНЦІЙ
БОЙОВОЇ ОБСЛУГИ БЕЗПЛОТНОГО АВІАЦІЙНОГО КОМПЛЕКСУ**

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Annotation: The paper substantiates a mechanism for analysis and development of a professional competence model for combat maintenance of an unmanned aircraft system used in a variety of organizational structures in Ukraine. The author's vision of further research into the subject is presented.

Keywords: model, competences, combat maintenance, unmanned aircraft system.

Анотація: Обґрунтовано механізм аналізу та розроблення моделі професійних компетенцій бойової обслуги безпілотного авіаційного комплексу, які застосовуються у різних організаційних структурах України. Подано бачення автора статті щодо подальшого дослідження порушеної теми.

Ключові слова: модель, компетенції, бойова обслуга, безпілотний авіаційний комплекс.

Introduction According to the research data [1], Ukraine makes a wide use of unmanned aerial vehicles both in the national economy and in the military sphere. This kind of vehicles is a part of unmanned aircraft systems that comprise a complex of interrelated and interdependent components, specifically: an unmanned aerial vehicle; combat maintenance service; communication channels for exchange of information between users of information, obtained by means of unmanned aerial vehicles; and a center for information collection, processing and delivery to users, which can be deployed at a command control center of a commander (chief) of force grouping (task force).

The main text Combat maintenance forms an important component of the aircraft system in question. In the opinion of the author, it can include: a navigator (maintenance supervisor), programming engineer and aircraft maintenance engineer. These specialists should have certain specified competences (qualities of the appointed persons, their abilities and professional skills) necessary for a successful fulfillment of the task of unmanned aerial vehicle control in a severe environment. As the experience of airmen proves [2], the required competences should be modeled for further improvement.

Modeling of individual competences of every specialist of an unmanned aircraft system (organizational structure) starts from application of special methods of



competence analysis. The analysis is made by comparing the functional duties of specialists with the knowledge, skills, and possible actions in the severe environment conditions, which they must have.

The model should be structured. *The structure of a competence model* is basically a repeated inter-comparison of its elements. As a result, general and particular indicators are identified; the elements are grouped according to their indicators, and groups of elements are compared.

In the course of modeling, several iterations (repetitions) are performed; all the names and definitions of competences are analyzed comprehensively. Regrouping of the identified characteristics is done in various combinations.

As suggested in the work [3, P. 70–71], the modeling process stages can be as follows: acquisition of an incoherent set of characteristics and actions of specialists that are subject to a study; grouping of the identified characteristics, and on this basis, discerning different conceptual areas (mega-groups); coordination of competences aiming to make the competence model structure more orderly; final formation of competences and competence indicators.

As theoretical and practical research shows [4, P. 75–78], a standard professional competence model should have the following components: a cluster of competences – a set of closely connected competences, normally three to five in one pack; a set of competences proper; levels of specified competences used to create a model for a particular specialist out of general models of the controlling bodies or their separate organization structures; indicators of specialist behavior in the severe environment conditions.

At the start of creating a competence model, it is necessary to decide whether the designed model will be the same for all the specialists of an organization (for instance, a command authority, headquarters etc.) or only for some of them.

At a later stage, attention should be focused on the *efficiency of the model*, which is to meet the following standards: to be easy to grasp by both executive staff and users; to have a simple structure and be described in plain language; to be relevant to specialists and those who will use it; to take into account both positive and negative changes taking place in the organization (an organizational structure of an unmanned aircraft system); to be regarded as “fair” by all the system specialists.

The models in question need not cover an extensive scope of competences. The practice of aviation equipment maintenance proves that an optimal number of competences can range from ten to twelve [2]. The base data for constructing a model can be obtained from answers to such questions as: What is the aim of creating a competence model for the specific organization? How will the designed model be used (for example, to appoint the combat maintenance personnel of an unmanned aircraft system to certain positions)? What much is an organization’s management interested to have the model?

Development of a model of competences for combat maintenance of an unmanned aircraft system is suggested to be realized in the following stages:

1. *Conceptualization of the ultimate goal of creating a competence model.* The process of conceptualization concerns both the organization’s management and its



personnel. This can be done during a round-table discussion or a briefing where a general agreement is to be reached as to the need for creation of that kind of model.

2. *Competence project planning.* The planning includes: collection and analysis of information about an organization's activity and scope of tasks; selection of personnel capable of evaluating the obtained data.

3. *Appointment of participants of the competence model development project.* It is desirable that the project manager should be the organization's head or one of deputy administrators (an acknowledged expert). Project team members can be both regular personnel members and external experts (experts from a superior organization structure or research institution specialists). An optimal team size is 5 to 6 persons. In case of time limitation, the number of team members may be increased.

4. *Choice of methodology for competence model development.* It is possible to make use of an available methodology – self-developed or borrowed; and if there is none, the project team devises its own special methodology for competence model design. In so doing, the team should determine: the number of competences for a model designed for a particular organization (taking into account combat maintenance personnel's actions in emergencies); a degree of competence elaboration (crude or detailed); the number of levels of competences elaborated in detail (the so-called zero or below-zero).

When developing standards for combat maintenance personnel behavior, it is possible to test the existing methods and techniques for collection of initial modeling data, and namely: a repertory grid technique, which allows determining what criteria are used by organization managers to evaluate their personnel according to its adequacy for jobs; a direct assessment method, which makes use of ready-made sets of competences allowing for an individual selection of the most and least appropriate competences for each specialist; strategic interview with the officials who determine future development (success) of an organization and the outcome of the accomplished tasks (a forecasting or strategic in-depth interview); brainstorming, which can be carried out in each unit of an organization with involvement of competent authorities; research on critical situations, which presupposes a study of an actual successful or unsuccessful case that meets a set of criteria and serves as an example for forming actions first and then characteristics and abilities, which specialists will need to perform their functional duties under the severe environment conditions with a minimal resource spend. The above mentioned methods and techniques should be applied in an integrated manner.

5. *Collection of information necessary to carry out modeling* includes: gathering examples of personnel's standard behavior, which ensures efficient performance of their functional duties; defining the standard behavior that may be required for effective performance of duties in future.

The main sources of such information can be the following documents: action strategy and plans of an organization as to using unmanned aircraft systems; job duty regulations and combat maintenance personnel manuals; resource materials for training the appointed personnel; recorded experience of the leading experts of aviation organizations (the number of such experts depends on complexity of tasks planned for trainees or examinees).



6. *Information analysis and development of a competence model.* It is expedient to make the information analysis by separate groups of the project team members. Each of the groups is to develop and substantiate its list of competences, based on: combat maintenance specialists' qualities that contribute to successful performance of their duties in one situation or another; selection of only those competences that will be on maximal display in the course of specialists' performance of their duties under difficult conditions; determining the number of competences sufficient to develop a competence model and evaluate performance of any given specialist.

A model of combat maintenance personnel competences, which is built on the basis of information from separate groups of project team members, may require a distribution of the substantiated competences into levels by two methods.

The first method: the levels of competences include only those examples of specialist behavior, which correspond explicitly to specific levels of activity.

The second method: the levels of competence are determined directly from the information about a specialist's duties and activity.

With these considerations in mind, one can conclude that clusters of standard behavior will show signs of various situations that emerge in the course of the specialists' operation under study.

Upon completion of the competence listing process, it is advisable to carry out an ultimate analysis and determine which of the competences are critical and which are only desirable. For this, it is necessary to answer the following questions: How important is a particular competence in terms of a combat maintenance specialist's assignment? What can be the consequences with regard to the substantiated competences? What positive outcome can application of the substantiated competences bring?

7. *Checking the competence model validity.* The validation can be performed by means of establishing a feedback from the specialists to model creators. This can be done in a round-table discussion format.

8. *Putting a developed model into operation.* The model is launched after it has been approved by the organization's management. Simultaneously, it is essential to inform combat maintenance personnel about the model purpose and the way it will be used. Besides, training is provided to those who will use it and those who are to undergo a checkout.

Eventually, the designed model is to lay the foundation for a system of selection, training, and management of an organization's combat maintenance personnel. Search for and recruitment of personnel becomes more focused and productive, since in that case an organization acquires a clearer vision of what type of specialists it needs; the head of an organization is provided with support in planning organizational potential with account of the required specialists' competences and training they will need; the foundation for an efficient system for training future specialists is laid with due regard to development of the necessary skills and expertise.

In the long run, the head of an organization will get a mighty tool for its improvement through training of the necessary specialists.

The developed model for professional competences of combat maintenance



personnel of an unmanned aircraft system is able to ensure assessment of the capabilities of a combat maintenance system's personnel.

Consequently, *a navigator* (the head of maintenance service) is to possess the knowledge of the following: resolutions, orders, directives, rules, regulations, instructions, methodological, regulatory and other governing documents on air pilotage, aircraft technical maintenance; aerial vehicles theory and design (aircrafts and helicopters); theory and practice of aircraft navigation (general and specialized); navigation situation in an area of application of an unmanned aerial vehicle. Also, a navigator should be capable of making non-standard decisions under difficult conditions, and have good skills of managing subordinates.

A programming engineer is to master modern information and computer technologies and be able to operate radio electronic equipment of the unmanned aerial vehicle.

An unmanned aircraft maintenance engineer is to know about modern methods of technical maintenance of the said vehicles and be able to provide the required technical readiness of the vehicles for combat use under any environment conditions.

In summation, the described above mechanism for developing a professional competence model for combat maintenance of an unmanned aircraft system displays organization of personnel's professional behavior, which can provide an effective discharge of tasks involving that type of vehicle. An area of further research is development of a technique for introduction of a professional competence model for combat maintenance of an unmanned aircraft system.

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PECULIARITIES OF ADMINISTRATIVE ACTIVITIES IN GENERAL EDUCATION ESTABLISHMENTS

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ОСОБЕННОСТИ УПРАВЛЕНЧЕСКОЙ ДЕЯТЕЛЬНОСТИ В ОБЩЕОБРАЗОВАТЕЛЬНОМ УЧЕБНОМ ЗАВЕДЕНИИ

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Abstract. The article is devoted to studying the problem of peculiarities of administrative activities in the establishment of general education. The essence and structure of managing the general education establishment as the integral part of the entire pedagogical system is considered. Modern conceptions in administrating the educational establishments in the western theory and the most characteristic approaches to management in the home general education are represented in the article, too.

Key words: management, managerial activities, general education establishment, essence and structure of management.

Аннотация. Статья посвящена изучению вопроса особенностей управленческой деятельности в общеобразовательном учебном заведении. Рассмотрены сущность и структура управления общеобразовательным учебным заведением как неотъемлемой части всей педагогической системы. Представлены современные концепции управления в западной теории управления образовательными учреждениями и наиболее характерные подходы к управлению в отечественном образовании.

Ключевые слова: управление, управленческая деятельность, общеобразовательное учебное заведение, сущность и структура управления.

Introduction. The problem of mutual correspondence of certain changes in the education-upbringing process and in the system of management of the general-education establishments (GEE) comes into force at the present stage of development of the general secondary education in Ukraine. The emergence of general-education establishments of different types, substantive work concerning the introduction of personally-oriented education, organization of profile education of different types, conditions for the external independent evaluation and so on – require constructing the effective systems of management with the use of certain technologies adequate to the processes that take place in education at present.

In the majority of works of the scientists (Yu. Babans'kyi, V. Bondar, L. Danylenko, Yu. Konarzhevs'kyi, V. Maslova, V. Portnova, M. Potashnyk, P. Tretjyakova and others) the management of general-education establishment is considered as the purposeful coordinated mutually supplemented system of actions of the governing and guided controlled subsystems for reaching the aim previously put forward. But from the view point of the theory of systems, managing the general-



education establishment manifests itself as a technological process of influence upon the wholesome, open, dynamic social-economic system.

At the same time analysis of the modern state of functioning the GEE and the use of managerial technologies permitted to make concrete the contradictions between contemporary demands to functioning and development of GEE and technologies of management which are used by Headmasters of educational establishments; between the tempos of development of the governing and guided subsystems; between real state of managing the GEE and the level of habits and skills of the subjects of management in regard to the application of administrating technologies in their activities; between the competence level of Headmasters at the GEE and the necessity to take decisions under the conditions of instability and changeability of situations. In this connection the problem of managing the educational processes is rather actual because school practice testifies to the insufficient preparedness of school Headmasters for professional administrative activities.

Essential modernization of the educational system foresees first of all the renewal of managing activities of school Headmasters. New conditions of life reveal the need and necessity to construct individualized competitive educational policy. The Headmaster of educational establishment plays the key role in this process. He stays in the centre of the social-economic and pedagogical changes, coordinates, directs the work of teachers on the staff; the degree of successful work of educational institution on the whole depends upon his economic literacy, initiativeness and his ability to take independent decisions of strategic and tactic character.

It is generally known that managing the general-education establishment is a complex dynamic process, a system of pedagogical influences with its peculiarities, namely: dynamics (flexibility); stability of process; cyclic character and succession of managerial processes and discreteness.

Management as the inseparable part of the pedagogical system of educational establishment and its system-forming base has objective nature, but according to the mechanism of realization it is a subjective process. Management may chiefly be intuitive or based upon theoretical foundations of science. In this connection it's extremely important to define the co-relation of practice and theory of management.

In Ukraine the problems of managing the educational establishments were investigated by such scientists as L. I. Danylenko, G. A. Dmytrenko, G. V. Elnikova, O. I. Marmaza, E. M. Pavlyutenkov, V. V. Kryzhko, E. M. Khrykov and others. But almost all of them state that the elaboration of the problem of managing the educational establishment is at present at the elementary level [1, p.6].

It should be noted that the peculiar feature of development of the theory of managing the educational systems in foreign countries is that it is based upon different social, pedagogical and psychological theories. It led to the conceptualization of development of the theory of managing the educational establishment; undoubtedly this point may be considered its main peculiarity.

It should also be noted that conceptualization of the theory of managing the educational establishment didn't become a peculiar feature of home science. It is connected with the fact that our scientists orient fully on the provisions of the general



theory of management and theory of social management. Really the essence of many scientific works touching upon school problems consisted in shifting the general provisions of the theory of management to educational sphere. And the peculiarities of educational establishments were taken into account mainly not on the conceptual but on the technological level.

The main text. There are four main conceptions of management in the western theory of managing the educational establishments [4, p.146].

The first of them appeared at the beginning of the XXth century. It is grounded on the criteria of economic efficiency of educational establishment. In the framework of this conception the educational institution is considered as a closed, mechanistic, rational system, and managing this system is aimed at ensuring its efficiency.

The second conception is based upon the criteria of pedagogical efficiency. It is grounded on the provisions of psychological science, and in the analytical aspect it is based upon the analysis of experience of administrators working at educational establishments oriented on the principles of behaviorism. The representatives of this conception consider the educational organization as a half-open, organic, natural system; managing this system is aimed at the integration of its constituent elements with the aim of optimizing their functioning. The accent in this model is made on human relations and managerial behavior.

The third model. The third model of management is based upon the criteria of flexibility. In the conceptual plane it is based upon: the theory of managing the development, theory of developing the organizational structures, theory of chance, and theory of institutional development. Adherents of this conception consider the educational organization as an open and adaptive system. In the process of managing this system the main significance is attached to the situational variables of the external surrounding with the aim of providing the political flexibility of the system.

The fourth model of management is based upon the criteria of relevance. Its starting points are the provisions of existentialism, dialectic method, critical realism and theory of human relations. In the framework of this model the educational organization is considered as the wholesome system of interacting elements; in the process of managing the system the specialists rely on consciousness and criticism of subjects, contradictions and unity of purposes in the context of cultural relevance.

At present the models of management based on the criteria of flexibility and cultural relevance are considered as the most updated.

The investigation of administrating the educational establishment from the view point of its structure of management permits to ascertain the fact that in the mutually connected net of positions – the governing and the guided subsystems, the first one plays the leading role. The structure of this subsystem in the majority of general education establishments has four levels of management, namely: the first level – school Headmaster appointed by the state organ of power or elected by the staff; the heads of school council, pupils' committee, and social organizations. This level defines the strategic directions of school development.

The second level includes: deputy directors of school, social pedagogue, school psychologist, a person responsible for the organization of the socially-useful labor,



senior pioneer leaders, assistant of the Headmaster in economic matters as well as organs and associations participating in self-governing activities.

Teachers, educators, tutors – all those who carry out the managerial functions in regard to pupils and their parents, children's associations and clubs in the system of out-of-class work are included into the third level.

The organs of class and general-school pupils' self-governing bodies comprise the fourth level. This level testifies to the subject-subjective character of relations between teachers and pupils. In this hierarchic scheme each of the above-mentioned level of the subject of management serves at the same time as the object of management in relation to higher levels.

In the guiding subsystem the chief place belongs to the pupils' body. Two levels of management vertically are distinguished in this subsystem: general school body and class body. Horizontally the guided subsystem is represented by pupils' social organizations, creative associations, circles, clubs, sporting sections, and further guided subsystem reflects the diversity and unity of the kinds of pupils' activities (educational, research, socially-useful and sporting).

Everything mentioned above led to the conclusion about the necessity to work out the conception of managing the general-education establishment; the conception should reflect most fully the essence of this phenomenon and in the most natural way synthesize in itself the achievements of the home and foreign theory and practice of management.

Summary and Conclusions. General-education establishment as the object of management is a complex open social-pedagogical system that regulates its activities with outside surrounding.

Managing the general-secondary establishment is based upon provisions of the theory of management. Its main constituent parts are certain tendencies and regularities correspondent to them, and principles of managing the general-education establishments connected with them. The fulfillment of management in accordance with the requirements that follow the elaborated rules and principles entirely depends upon the managing activities of Headmasters of educational establishments.

The tendencies of development in managing the educational institution are defined by the progress and condition of the state management, by social and economic processes in a society. But the system of education in Ukraine is the main factor that influences the processes of management in educational establishments; it reflects all the phenomena that take place in the state and outside its borders.

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