

Future Military Pilots' Professional Competence Formation

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Abstract: The article foregrounds the need for future military pilots' professional competence formation taking into consideration the growing amount of armed conflicts. The analysis of the literary sources indicates that scientists are interested in improving the professional training of future military pilots, but not enough attention is paid to the formation of professional competence of these specialists. Our research set a goal to experimentally test the singled out organizational and pedagogical conditions for future military pilots' professional competence formation (interdisciplinary integration with the goal of future military pilots' tactical thinking forming; the use of simulator-based training to practice different types of combat flights by future military pilots; making use of operational pilots' experience and analysis of combat employment of aviation for the purpose of updating air-tactical knowledge and improving air-tactical training of future military pilots) whether they contribute to the effective formation of the abovementioned definition. The experiment involved 227 persons (undergraduate future military pilots (20–22 years old)), the experimental group consisted of 127 persons, the control group made 100 persons. These groups were qualitatively homogeneous at the initial stage of the experiment. The implementation of distinguished organizational and pedagogical conditions into the educational process of higher military educational institutions provided an opportunity to effectively shape the professional competence of future military pilots, which is confirmed by the methods of mathematical statistics. Thus, the conducted scientific search confirms the effectiveness of proposed conditions of future military pilots' professional competence formation.

Keywords: *professional competence; military pilots; organizational and pedagogical conditions; higher military educational institution.*

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1. Introduction

The modern development of world civilization is characterized by an increasing role of military factors in the settlement of international political, economic, ethnic, inter-denominational and other conflicts; uncontrolled migration of the population; activities of extremist and terrorist organizations; increasing the volume of military and scientific knowledge; development and testing of the latest weapons systems and military equipment, improvement of the principles of their systematic combat use, etc. At the same time, the global experience of the wars and armed conflicts of recent decades, as well as the conduct of anti-terrorist operations, testify to their success through military, economic and technological factors that are products of human knowledge. In this context, military professional training is becoming actual, in particular for future pilots, who are familiar with modern forms and types of military combat and are able to acquire new knowledge, improve skills and abilities at all stages of their career; to command troops (forces) in combat (operation); to organize training, education, moral and psychological training of personnel in peacetime and in wartime; to operate and employ the most sophisticated weapons and military systems; to act in risky situations and so on.

The implementation of these requirements is, first of all, connected with the construction of models and the adjustment of the content of training of military specialists, in particular military pilots, which should be based upon a systematic and competent approaches and take into account national interests, national security of the state; requirements to military pilots, their perceptions of the nature and structure of combat and service activities; gradual development of personality, etc.

2. Problem Statement

Literature Review. The need to analyze the theory and practice of the problem of professional training of future pilots is stipulated by the need for theoretical generalization and systematization of previously learned scientific knowledge about the essence and content of the processes of formation of professional competences in the higher education system in general.

Researches by the scientists Plachynda, Herasymenko, Pukhalska and Kryzhevskya emphasize the need for the use of IT technologies in the professional training of future pilots. They substantiate it by the fact that the use of computer programs, such as educational platforms like MOODLE,

improves the quality of the educational process. Taking into account the young people's habit of using personal electronic devices, it is the digitization of the educational environment that stimulates future professionals to active learning activities (Plachynda et al., 2019).

Loureiro and Santos presented the study of the usage of information and communication technologies (ICT) in professional military education at the Portuguese Armed Forces Military University (Loureiro, Santos, 2020). Formation of motivation towards active educational activities of future aviation specialists emphasized by Plachynda, Pukhalska, Kryzhevskaya, Dranko, Ursol, Bloschynskiy and Didenko. In their scientific work, the authors presented the results of experimental research on the formedness of motivational component towards future pilots' active educational activities (Plachynda et al., 2019). In other study, the scientists examined military pilots' aviation education from 1973 to the present based on the SWOT analysis. Their article reveals the strengths, weaknesses, risks and opportunities for future aspects of aviation education quality (Rozenberg et al., 2019).

The next research set the goal to study historical experience and acquire applicable knowledge to create new curricula of the Aeronautics Faculty graduates at the Kosice Technical University in the Transport research area, in accordance with approved new descriptions by the Accreditation Committee (Kalavský et al., 2019). Such scholar as I. Bloschynskiy revealed the importance of ICT usage in the system of future border guard officers' professional training (Bloschynskiy, 2017a). Some details on these issues can be also found in the works of (M. Karpushyna, I. Bloschynskiy, A. Nakonechna and K. Skyba) dealing with the enhancement of Ukrainian would-be border guards' training, and using some computer programs to intensify the learning process of these military specialists (Karpushyna et al., 2019; Bloschynskiy, 2017b).

Yun Chul, Oh Sohyun, Shin Young Ho stressed that the success or failure of high-gravity training could be multifactorial (Yun et al., 2019). The investigation of the efficacy of life skills education in military services all over the world was performed by Hosseini-Shokouh et al. (2018).

The findings of other scholars concerning prevention training program of drug abuse of military personnel in Iran were presented by Dabaghi et al. (2018). Development of healthy lifestyle and cadets' endurance and power qualities during physical sessions was studied by Prontenko et al. (2019) and Prontenko, Griban, Bloschynskiy, Boyko, Loiko, Andreychuk, Novitska, Tkachenko (2019).

Issues of advantages of the real situation transformation into elements of simulation and into the real context were presented by (Badea, Coman, Iancu, Bucovețchi, 2018). Peculiarities of military personnel training, namely military interpreters can include simulation of combat environment (fire shooting, sound interference, secrecy of actions) where real-life communication takes place (Lahodynskyi et al. 2019). These aspects of cadets training at Military Diplomatic Academy named after Yevheniy Bereznyak and study of English Spycraft Professionalisms as a Linguistic Phenomenon were revealed in the study of Lahodynskyi et al. (2018).

However, the attention of scientists was not focused on the formation of future military pilots' professional competence, but, in our opinion, the present time requires high competitiveness and competence from the specialists. Therefore, our research is aimed at the experimental verification of the distinguished organizational and pedagogical conditions formation of the specified definition.

3. Participants

The research was conducted through 2014–2019. The experimental group (EG) consisted of 127 undergraduate future military pilots (20–22 years old). The comparative background was presented by other future military pilots who were not within the scope of the developed organizational and pedagogical conditions (control group, CG) in the number of 100 undergraduate future military pilots.

4. Methodology of Research

The qualitative homogeneity of EG and CG was verified using the Wilcoxon criterion. The empirical value of this criterion is equal to the sum of the order numbers of a smaller sample in the total variation series; whereas, the ranks of the same variants of different samples are equal to the arithmetic mean of their order numbers in the total variation series. Critical points of the Wilcoxon criterion are found in terms of significance level $\alpha = 0,05$ and sample volume. The calculation results are given in Table 1.

Table 1. Critical points of the Wilcoxon criterion
(significance level $\alpha = 0,05$)

	$n_1 = 100, n_2 = 127$ CG–EG	$n_1 = n_2 = 100$ CG–CG	$n_1 = n_2 = 127$ EG–EG
Lower critical point $W_{lower\ cr.p.}$	10437	9247	15044
Upper critical point $W_{upper\ cr.p.}$	12363	10853	17340

If the empirical value of the criterion does not go beyond the critical domain, then at the significance level $\alpha = 0,05$ we can state that the samples are qualitatively homogeneous; if the empirical value goes beyond the critical domain, then we can state with 0.95 certainty that the samples are qualitatively heterogeneous.

The goal of the experimental work was to check the effectiveness of the proposed organizational and pedagogical conditions implementation of future military pilots' professional competence formation. The specified quality formation was determined by cognitive, praxeological, motivational and personal components according to which such criteria as intellectual, practical-activity, behavioural and individual were distinguished.

The study of the cognitive component was carried out through the evaluation of the complex of air-tactical theoretical knowledge by analysing the completeness and quality of exercising the preparation elements to accomplish the assigned task by the future military pilots.

The study of the praxeological component was carried out by implementing the methods of observation and evaluation carried out by the instructor of an aviation simulator taking into account individual elements of combat flights (combat use) according to the Course of ground and flight training of cadets accomplished by the future military pilots on the aircraft simulator.

The diagnosis of the motivational component was performed according to the methodology developed on the basis of K. Zamfir's method in A. Rean's modification "Motivation for Professional Activities" (Motivation of professional activity, 2020).

The study of the individual component was carried out using the following methods: a questionnaire test "Will Self-Regulation" (A. Zvierkov, E. Eidman) by was used to identify the special features of will self-regulation of personality; differentiated measurement of anxiety as a state (situational anxiety) and as a personal feature (personal anxiety) was carried out with the

help of “Anxiety Diagnosis” questionnaire by Ch. Spielberger (adaptation by Yu. Kanin); the technique of “Temporal Semantic Differential” was used with the purpose to determine the temporal orientation, the degree of orientation to the present, past and future.

At the initial stage of forming the future military pilots' professional competence we received the indicators presented in Table. 1.

Table 2. Generalized data on the formedness level of future military pilots' professional competence in the study groups at the initial stage of the experiment (in %)

Criterion	Group	Level		
		Low	Medium	High
Intellectual	CG	39,0	49,0	12,0
	EG	41,0	48,8	10,2
Practical-activity	CG	38,0	52,0	10,0
	EG	39,4	51,2	9,4
Behavioural	CG	29,0	52,0	19,0
	EG	32,3	50,4	17,3
Individual	CG	27,0	51,0	22,0
	EG	28,3	52,0	19,7
Total	CG	32,2	52,0	15,8
	EG	35,2	50,6	14,2

The obtained results showed that the formedness level of future military pilots' professional competence according to the specified criteria is not significantly different in the experimental and control groups.

5. Results of Research/Findings.

Regarding modern scientific knowledge, the intellectual abilities enhancement involves the purposeful development of the intelligence of a future military pilot in the course of his/her professional training in the following ways: implementation of the principles of developmental teaching in professional training in order to form new and develop already existing mental images that determine the intellectual abilities; use of technology in education and implementation of principles of developmental teaching, including those to form skills of rapid mental actions under adverse effects of combat flights.

In order to solve the problems identified in the traditional system of theoretical training of future military pilots, we have introduced organizational and pedagogical conditions for future military pilots' professional competence formation, namely: interdisciplinary integration with the goal of future military pilots' tactical thinking forming; the use of simulator-based training to practice different types of combat flights by future military pilots; making use of operational pilots' experience and analysis of combat employment of aviation for the purpose of updating air-tactical knowledge and improving air-tactical training of future military pilots.

These conditions are realized in the forms and methods of training, namely: 1) honing skills of joint activities in the process of theoretical training; redistribution of the content of theoretical training in accordance with combat tasks practiced on aviation simulators; 2) application of concepts of "image" of combat flight, active air fighter, joint activity, air-tactical training on aviation simulators, individual approach, air-tactical skills, systematic air-tactical training in the process of simulator based training; modelling and planning of combat flights with their further practice on aviation simulators; 3) development of air warfare concepts and options for their development based on an analysis of the combat use of aviation in recent local wars, armed conflicts and joint operations.

Among the main indicators of the effectiveness of the implementation of our organizational and pedagogical conditions were selected the following: increase in the number of future military pilots with formed personality features, reflecting the high and medium level of professional competence and ability to perform different types of combat flights; decrease in the number of persons with low level of professional competence formation in the experimental group (such level of professional competence formation was considered insufficient to perform combat flights and further work was carried out with these persons to increase their level).

We obtained positive results upon the abovementioned conditions implementation for future military pilots' professional competence formation in the institutions of higher military education of Ukraine. Thus, in the CG, according to the results of the experiment we monitored decrease in the number of persons with the low level of professional competence formedness from 32 to 30 (by 2.5%), increase in the number of persons with the medium level of professional competence formedness from 52 to 53 (by 0.7%) and increase in the number of persons with the high level of professional competence formedness from 16 to 17 (by 1.8%) (Fig. 1).

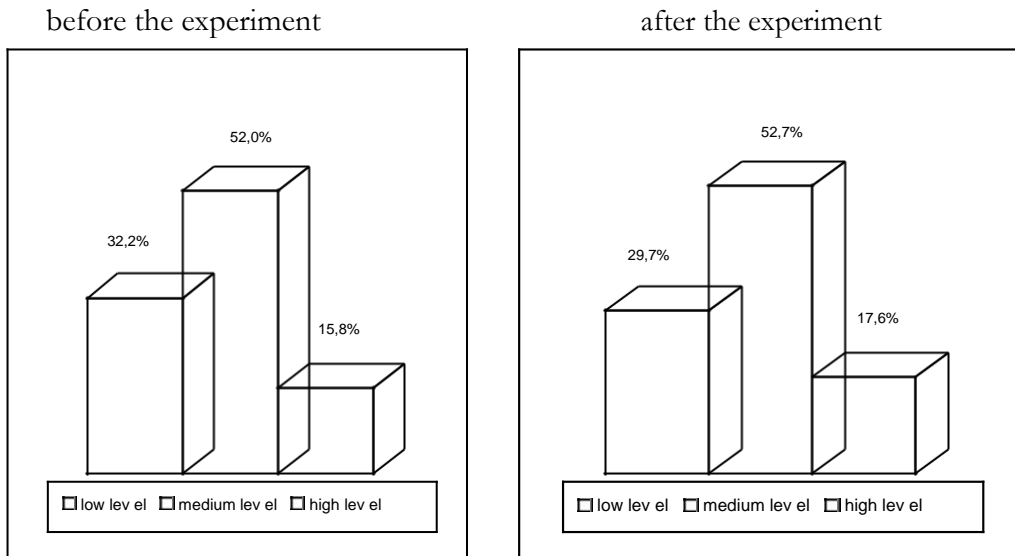


Figure 1. Diagrams of the level of professional competence formedness of future military pilots in CG before and after the forming experiment

Positive changes in the EG were more significant, namely: decrease in the number of persons with the low level of professional competence formedness from 45 to 20 (by 19.6%), increase in the number of persons with the medium level of professional competence formedness from 64 to 70 (by 4.7%) and increase in the number of persons with the high level of professional competence formedness from 18 to 37 (by 14.9%) (Fig. 2).

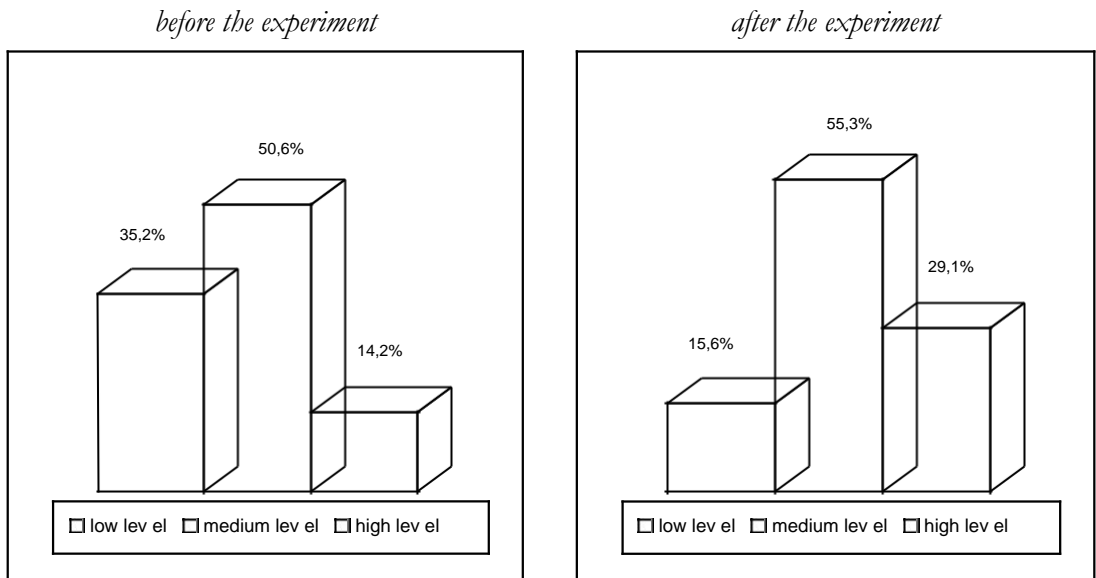


Figure 2. Diagrams of the level of professional competence formedness of future military pilots in EG before and after the forming stage

Thus, the organizational and pedagogical conditions effectiveness for the future military pilots' professional competence formation was experimentally proved.

6. Conclusions

Analysis of the scientific literature of the current state of professional training of future military pilots has revealed that their purposeful complex preparation to perform combat missions for the purpose of aviation requires improvement in accordance with the modern level of technology development, which necessitates the organization and carrying out of purposeful "air tactical training" in order to increase the level of their air-tactical skills by combining theoretical and simulator training within the structural and logical scheme.

The systematization of scientists' views on professional training of aviation specialists and taking into account the specifics of their combat flight activities made it possible to determine the structural composition of professional competence as a unity of four components such as cognitive, praxeological, motivational and individual. According to the structure of professional competence, four criteria were distinguished (intellectual,

practical-activity, behavioural and individual) and their indicators were characterised, which made it possible to evaluate the level of future military pilots' professional competence formedness in the course of their air-tactical training. Depending on the manifestation of the identified indicators of future military pilots' professional competence, three levels of its formation were distinguished: high, medium and low.

For the purpose of effective formation of future military pilots' professional competence, it was proposed to introduce organizational and pedagogical conditions in higher military educational institutions, namely: interdisciplinary integration with the goal of future military pilots' tactical thinking forming; the use of simulator-based training to practice different types of combat flights by future military pilots; making use of operational pilots' experience and analysis of combat employment of aviation for the purpose of updating air-tactical knowledge and improving air-tactical training of future military pilots.

The article presents the results of experimental validation of the specified organizational and pedagogical conditions effectiveness for future military pilots professional competence formation. The results of the pedagogical experiment testified significant positive changes in the experimental group concerning future military pilots' professional competence formation, namely: decrease in the number of persons with the low level of professional competence formedness from 45 to 20 (by 19.6%), increase in the number of persons with the medium level of professional competence formedness from 64 to 70 (by 4.7%) and the high level from 18 to 37 (by 14.9%). Positive changes, but insignificant, were revealed in the control group, which proved the effectiveness of organizational and pedagogical conditions for future military pilots' professional competencies formation.

The conducted research does not exhaust all aspects of the problem, therefore, the promising directions of further scientific exploration are the following: improvement of the developed organizational and pedagogical conditions by specifying them in accordance with types of aviation (fighter, assault, bombing, reconnaissance, transport, army); development of new forms and methods of training using information technologies and creation of a structural-organizational model of future military pilots' professional competence formation.

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