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Preparing Future Officers for Performing Assigned Tasks through Special Physical Training

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Abstract: The use of the newest pedagogical technologies (techniques) with the accentuated influence of the modern technical means of training during practical classes with the SPT and other forms of physical training with the cadets of the National Academy of National Guard of Ukraine during their professional development ensures that they acquire the necessary level of readiness to perform assigned tasks and is the priority of the scientific research. The article aims to formulate a model for forming future officers' readiness to perform assigned tasks using special physical training in higher military educational institutions and to analyze the results of the pedagogical experiment on its implementation. While conducting the pedagogical experiment, the modern technical means of training and functional complexes were used, which increases the level of special physical readiness among the representatives of the experimental group. Also, pedagogical conditions for forming future officers' readiness to perform assigned tasks using special physical training at the Command faculty of the National Academy of the National Guard of Ukraine were experimentally verified. To improve the "shock" technique of HHC (the technique of applying physical activity measures) and the explosive force, we used the hardware-software system of the martial arts technique "Katsumoto" impact registration (HSS "Katsumoto"), video monitoring of technical handicap operations, Human Reactions Complex (AECS – LAB). Experimental work was implemented in two groups: the control group (CG, n=62) and the experimental group (EG, n=61). It is experimentally confirmed that the high qualification level of special physical readiness ensures the high-quality performance of assigned tasks.

Keywords: *cadets, professional competency, pedagogical conditions, modern technical means of training, qualification levels.*

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Introduction

The high level of servicemen's combat readiness, as well as their participation in the missions and operations, depends on the individual level of their professional readiness. It is reinforced by a permanent process of education, which is organized according to the requirements of the manuals and guidelines, combat experience, adherence to the teaching methods and the needs of presence. Therefore, the definition of modern models of professional training for military personnel is a priority of the scientific research.

Of particular **importance is** the diverse and effective training of the NGU future officers, who will train their subordinates in future, following the task and responsibilities, which the personnel have to perform and conduct.

An analysis of scientific and methodological literature on the process of forming future officers' readiness to perform assigned tasks by means of special physical training, the questioning of leading specialists in combat and special (physical) training, the analysis of the results of previous research (Muntian, 2013; Podrigalo et al., 2016; Del Vecchio et al., 2018; Boyali, Sevindi, Yüksel, & Demir, 2018; Băiţel & Deliu, 2014; Vences Brito, Ferreira, Cortes, Fernandes, & Pezarat-Correia, 2011; Bizin, Mirgorod, & Khatsaiuk, 2014; Artemiev, Yareshchenko, & Sergienko, 2011; Melnyk et al., 2019; Sheremet, Leniv, Loboda, & Maksymchuk, 2019; Gerasymova et al., 2019; Byvalkevych, Yefremova, & Hryshchenko, 2020; Sebalo, & Teslenko, 2020; Koziuk, Hayda, Dluhopolskyi, & Kozlovskyi, 2020; Kozlovskyi, 2010; Kaletnik, Zabolotnyi, & Kozlovskyi, 2011; Novikov, 2004; Lodatko, 2010; 2011; Yarmachenko, 2001) in this field, own combat and pedagogical experience of teaching the "SPT" course, the experience of taking part at various levels of championships on the Ministry of Internal Affairs of Ukraine level proves the need to improve professional competency in future officers.

The key points within the implementation of modern pedagogical technologies which should be taken into consideration are the changes in the rates of future officers and not only the results of the training but also the state of their health. So, one of the recent studies is devoted to the interconnections of morphological functional characteristics of students practicing in martial arts (Podrigalo, Iermakov, Alekseev, & Rovnaya, 2016; Boyali, Sevindi, Yüksel, & Demir, 2018), as well as the determination of the biomechanical parameters of action in martial arts fight (Bizin, Myrhorod, & Khatsaiuk, 2014). It is important to prevent injuries in martial arts and

combat sports and, therefore, this issue requires separate research (Del Vecchio et al., 2018).

Modern technologies are used in the process of implementing the program of servicemen's physical training for the qualification tests on the right to own "the honour beret" (Anatskyi, Kolomiitseva, & Liubchich, 2018), in the process of determining the effectiveness of preparatory exercises on the taekwondo athletes' hematological indicators (Boyali, Sevindi, Yüksel, & Demir, 2018), implementing the kinematic analysis of the cross-stamp used in full-contact system and kinematic and electromyographic analysis of the karate (Vences Brito, Ferreira, Cortes, Fernandes, & Pezarat-Correia, 2011) and others closely related to the area of this research.

Such prominent scholars as Bizin, Myrhorod, & Khatsaiuk (2014) studied the issues of improving technical skills in servicemen and law enforcement officers of the Ministry of Internal Affairs of Ukraine based on the use of modern technical means of training. They define how to develop and improve the necessary skills of service and applied HHB. Besides, the modern technical means of training (MTMT) proposed by the above-mentioned scholars allow accelerating the process of improving HHC technical skills with the cadets, law enforcement officers of the Ministry of Internal Affairs of Ukraine and servicemen of various military units.

In textbooks of Artemiev, Yareshchenko, & Sergienko (2011), Khatsaiuk, Harkavyi, Stadnik, & Ananchenko (2018), the content of the educational course on special physical training is elaborated. It assists future officers in developing the necessary physical fitness level to perform assigned tasks.

However, despite the considerable interest of scholars in this phenomenon, the research process does not sufficiently analyze the process of forming future officers' readiness to perform assigned tasks using special physical training.

The analysis of regulatory documents, scientific works and current levels of future officers' combat readiness during professional training has revealed the following *contradictions* between:

1) the society's need for officers ready for service and fighting and the lack of the necessary conditions to develop such readiness;

2) the need for contractual recruitment of military and special purpose law enforcement officers and the lack of unified training programmes aimed at ensuring the required level of special physical qualities and military-applied skills, as well as methodological knowledge needed by future officers of the National Guard of Ukraine to organize the process of professional training

of subordinate personnel;

3) the need to transform training programmes for future officers of the National Guard of Ukraine enrolled in f higher education study, taking into account the existing experience of military operations, the experience of NATO military personnel and the use of new methods (technologies) of their training within the framework of different disciplines;

4) the need to specify the criteria for readiness to perform assigned tasks and qualification degrees of special physical readiness of future officers of the National Guard of Ukraine and the existing methodology for assessing the level of future officers' professional readiness;

5) the need to select an effective model for developing future officers' readiness to perform assigned tasks in military higher education institutions and the existing degree programmes for future officers of the National Guard of Ukraine;

6) the need for comprehensive training of future officers of the National Guard of Ukraine to perform assigned tasks during their study of different disciplines (special physical training, tactical training, fire training) and the existing system of the educational process organization in military higher education institutions.

The relevance of this research lies in the urgency of solving this particular problem in light of the current challenges, the need for its theoretical and practical justification and systematization, as well as the mentioned contradictions.

Materials & methods

The pedagogical experiment has been conducted to verify the effectiveness of the content and functional model for preparing future officers to perform assigned tasks using the educational material base of the National Academy of the National Guard of Ukraine (Kharkiv) and the military training centres of the military units of the NGU in the period from 15 August, 2016 to March 10, 2019, which was attended by male cadets of the Command faculty of the five study groups (215, 225, 235, 245, 255) with the total number of 121 persons at the age between 19 and 22. All students agreed to participate in the pedagogical experiment. At the beginning of the experiment, the candidates for participation in the pedagogical experiment were medically examined, and appropriate recommendations were recorded by medical specialists in health registration personal books. The pedagogical experiment was carried out following a pre-designed plan, which, in addition to the main direction of the study, provided for the observance of ethical

norms and requirements of measures to prevent injuries during practical classes in the course on SPT and various forms of physical training.

All the cadets were familiarized with the document, titled "On Ethical Standards in Research Organization", and agreed to participate in the pedagogical experiment. In addition, they were instructed on the procedure of writing tests, as well as on the precautionary measures and prevention of injuries during the experiment. In accordance with the above-mentioned aspect, they signed a written consent to voluntary participation in the pedagogical experiment.

The candidates for participation in the pedagogical experiment were selected in accordance with the author's programme for selecting the cadets of the Command faculty of the National Academy of the NGU. In organization terms, the selection process consisted of 3 stages: 1) the preliminary selection; 2) the in-depth verification of the cadets' compliance with the requirements of the pedagogical experiment plan; 3) the participation in the pedagogical experiment.

Stage 1 aimed to check whether the cadets were capable of developing physically by determining their potential abilities and inclinations underlying the development of basic physical qualities, as well as by assessing the level of their motor activity. The levels of their physical readiness were tested in accordance with the Instruction on the organization of physical training in the NGU.

Stage 1 sought to verify the compliance of the pre-selected cadets with the requirements of the pedagogical experiment. Special qualities, personality traits and required levels of physical readiness have allowed the experimenters to determine the levels of the cadets' special physical fitness and their readiness for tests under the conditions of the pedagogical experiment. During three months, the experimenters worked on identifying potential abilities of the cadets in accordance with pedagogical observations, interviews, check performance of physical training tests. Subsequently, they were allowed to participate in the pedagogical experiment and divided in control and experimental groups.

During Stage 3, CG and EG cadets worked on improving their level of special physical readiness in the accordance with the author's pedagogical experiment plan.

It must be noted that all physical exercises, special tests, complexes were performed in accordance with the requirements of the Instruction on the organization of physical training in the NGU, taking into account age groups and categories of servicemen.

Thus, experimental work was implemented in two groups: the control group (CG, n=62) and the experimental group (EG, n=61). During the pedagogical experiment, the studied CG students used the traditional method of developing and improving the necessary military-applied skills (necessary physical qualities) aimed at increasing the readiness to perform tasks foreseen by the work program of the course on SPT (targeted influence on the groups was not carried out).

In EG, conditions were created to introduce the content and functional model for preparing future officers to perform assigned tasks using SPT at the HMEI (NANGU) with accentuated use of SPT. Repeated and systematic testing of special exercises and techniques of the HHC under the conditions of obtaining purposeful comprehensive urgent information on the basic parameters of military-applied movements allowed CG students to increase the level of individual special physical fitness.

To improve the "shock" technique of HHC (the technique of applying physical activity measures) and the explosive force, we used the hardware-software system of the martial arts technique "Katsumoto" impact registration (HSS "Katsumoto") (Karataieva, & Khatsaiuk, 2006).

This complex is intended for measuring the biomechanical indices of the technique of strikes of service and applied martial arts adopted by the Ministry of Internal Affairs of Ukraine. The Katsumoto agro-industrial complex allows one to quickly, precisely and reliably conduct measurements of the force of impact, the speed of the strike effort, the speed of the reaction of those servicemen who are studying on light and sound stimuli. It consists of the following components: a measuring platform, a measuring device based on the PIC16F876A microcontroller and a personal computer with special software.

Using the Katsumoto HSS in full volume with the use of a computer and specially developed software, one can obtain detailed and reliable information on the characteristics of the shock actions of those who study in the form of graphs of the growth of the impact amplitude in time and thus see how fast this, who learns, attains maximum amplitude (forces, speed) during shock actions.

The assessment of servicemen's technical skill of strike actions is carried out based on the analysis of the most informational indicators of close combat, which are closely related to the practical performance of military and combat duties: measures of physical influence, force detention, the elimination of criminals, offenders, terrorists and others. An integral part of this complex is a multipurpose makivara, equipped with strain gauges designed to work out the accuracy of striking forces, measure the strength

and speed of strikes used in martial arts. The advantage of this makivara in contrast to stationary tenzopatforms is its multifunctionality. Its sensors are positioned like pain points on the human body. Bidders may conduct series and combinations of strike action on these points. Information from the sensors enters the system block of the computer, is processed by the application and is displayed on the monitor in the form of charts. Based on these data, we conduct a qualitative analysis of the shock technique of the investigated serviceman.

In parallel with the HSS "Katsumoto", it is recommended to conduct video monitoring of technical handicap operations, which in turn allows one to conduct a qualitative comparative analysis of the speed charts and the strength of the drill equipment of HHC after the training session with the SPT. This allows one to draw up a plan for further improvement of the impact equipment and make adjustments in the direction of improving and optimizing the military actions of the serviceman.

The Human Reactions Complex (AECS – LAB) (Khatsaiuk, 2008, pp. 36–42; 2010; 2011; Bizin, Myrhorod, & Khatsaiuk, 2014) (see Figure 4) is designed to investigate human reactions during scientific research, testing candidates for service in various power structures, in employment centers, in educational institutions, in psychological centers, in sport medicine etc.

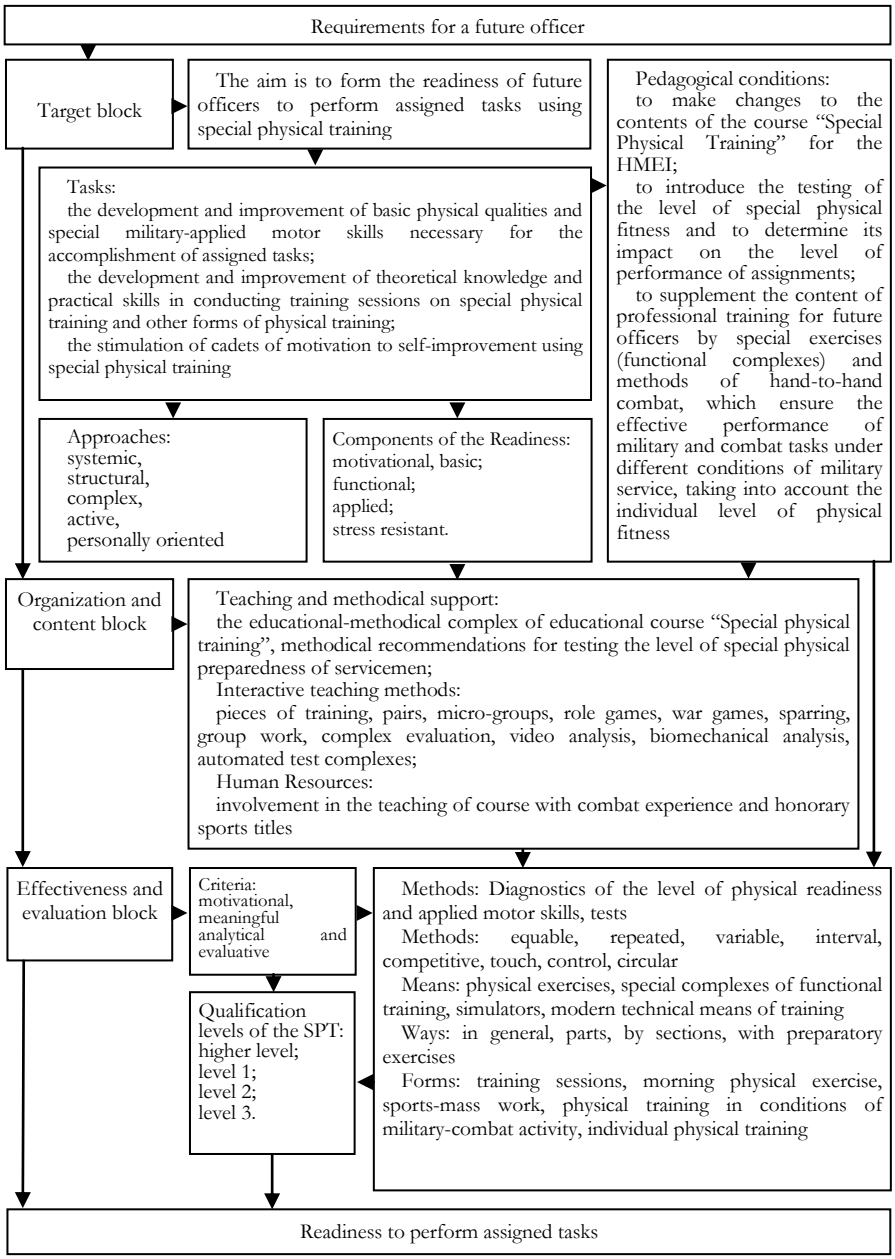


Figure 1. *The content and functional model for forming future officers' readiness to perform assigned tasks using special physical training in higher military educational institutions*

The greatest diagnostic effect when using the complex is achieved during the dynamic observation of the same study for a long time. It allows one to compare the current characteristics with the output and timely identify trends in the direction of their deviation, to determine the time of a simple sensorimotor reaction to light and sound stimuli, the time of a complex sensorimotor reaction to light, the critical frequency of fusion of light inclining, the choice of reaction, differentiation, tepingometry in various modifications.

The Human Reactions Complex (AECS – LAB) in the context of this study makes it possible: to study the properties of the nervous system, stable characteristics of the mental state, individual style of activity, functional readiness; to register the dynamics of changes in the mental state and disability during significant physical activity; to establish the peculiarities of the mental state at a certain point in time (before performing complicated technical actions of the HHC, special exercises and techniques during practical classes with the "SPT", etc.); to quantitatively measure the psychomotor parameters of the processes of mental regulation and, following the results obtained, to establish the features of attention, volitional and emotional regulation.

The video computer system of express analysis of martial arts "Katsumoto" technique (Khatsaiuk, 2008, pp. 36–42; Bizin, Mirgorod, & Khatsaiuk, 2014, pp. 32–35) makes it possible to effectively perform a comparative analysis of the implementation of special exercises and movements (techniques of Belarus) during practical classes with the "SPT".

This application determines the speed of technical actions, acceleration, movement of the total centre of mass, individual human bio links and the radius of technical actions. The comparative graphs based on the data obtained are being constructed.

Research of the technical actions performed during practical exercises on special physical training can be carried out in the conditions of field outputs, direct execution of the combat and service tasks (CST), which significantly improves the quality of performing the assigned tasks.

At all stages of the experiment, we were shooting video using camcorders. In turn, modern video cameras allow you to record fast-changing processes with 1/3500-cc shutter speed. – 1/50 sec, which fully meets the requirements for determining the spatial coordinates of biolanics and eliminates the blurred (greasy) reflection. To reduce the effect of perspective deformations, the image of the camcorder was placed on a tripod (height 100 cm).

Two cameras of this class were used, which simultaneously carried out shooting in different projections (horizontal, vertical). The cameras were positioned so that the lens completely got into the places of training or the completion of technical tasks with the "SPT". By doing this, the minimum effect of nonlinear sweep and optical distortion at the edges of the frame was achieved. With the help of HSS "Katsumoto", spatial characteristics of the performance of technical HHC were determined.

Results

The general results of the application of the content functional model for forming future officers' readiness to perform assigned tasks using SPT in the HMEI with the accented use of MTMT showed that the level of special physical fitness of CG students is at a higher level of 15% and of 18% in EG. The third level (lowest) of special physical fitness is characteristic of 27% of CG and 10% of EG. The basic data is the evaluation results of EG and CG (see Table 1).

Table 1. *Results from the formation of future officers' readiness to perform assigned tasks using special physical training*

Levels of readiness	CG (n=60) before the beginning of the experiment (persons)	EG (n=61) before the beginning of the experiment (persons)	CG (n = 60) after the experiment (persons)	EG (n = 60) after the experiment (persons)
higher level	8	6	9	11
level 1	9	9	10	21
level 2	24	35	25	23
level 3	19	11	16	6

According to the calculations made in the computer program "Statistics in Pedagogy", the authors of the article have obtained data, which are displayed in Table 2.

Consequently, the proposed pedagogical conditions have positively influenced the qualification level of special physical preparedness and readiness to perform assigned tasks, respectively. Since the data was obtained as a result of measurements on a scale, the number of graduations

of different points is equal to four, and the volume of samples is not small (N, M> 50), then we used the criterion χ^2 in the study.

Table 2. *Descriptive statistics of the experiment on forming readiness in future officers to perform assigned tasks using special physical training at the HMEI*

Parameters	CG (n=60) before the beginning of the experiment	CG (n = 60) after the experiment	EG (n=61) before the beginning of the experiment	EG (n = 60) after the experiment (persons)
Research sample	60	60	61	61
Min	1	1	1	1
Max	4	4	4	4
Interval	3	3	3	3
Amount	174	168	173	146
Average	2,9	2,8	2,8361	2,3934
Median	3	3	3	2
Dispersion	1,0068	1,0102	0,706	0,8093

When comparing control and experimental groups before the experiment, the empirical value of the criterion χ^2 is 4.4619, and the critical value is 7.815. The characteristics of the comparative samples coincide at the level of significance of 0.05. A statistically substantiated conclusion is drawn that both samples belong to one general population that is, so they are homogeneous.

When comparing control and experimental groups after the end of the experiment, the empirical value of the criterion χ^2 is 8.7243. The reliability of the differences in the characteristics of the comparison groups is 95%. A statistically substantiated conclusion is drawn that both samples belong to different general aggregates, so they are different.

When comparing a control group to the beginning and after the end of the experiment, the empirical value of the criterion χ^2 is 0.399. The characteristics of the comparative samples coincide at the level of significance of 0.05. A statistically substantiated conclusion is drawn that both samples belong to one general population that is, so they are homogeneous.

When comparing the experimental group before and after the end of the experiment, the empirical value of the criterion χ^2 was 10.2239. The reliability of the differences in the characteristics of the comparison groups is 95%. A statistically substantiated conclusion is drawn that both samples belong to different general aggregates, so they are different.

Thus, all conditions for experimenting were sustained, and in the experimental group, there was a positive dynamics of the formation of readiness to perform the assigned tasks. Experimental work has positively influenced the increase of professional competence of servicemen (cadets of the NANGU). It was noted that these changes were more likely to occur in cadets of the experimental group compared with the control group, and these changes are statistically significant.

The results of forming readiness in future officers to perform assigned tasks using special physical training in the experimental and control groups are presented in Fig. 2.

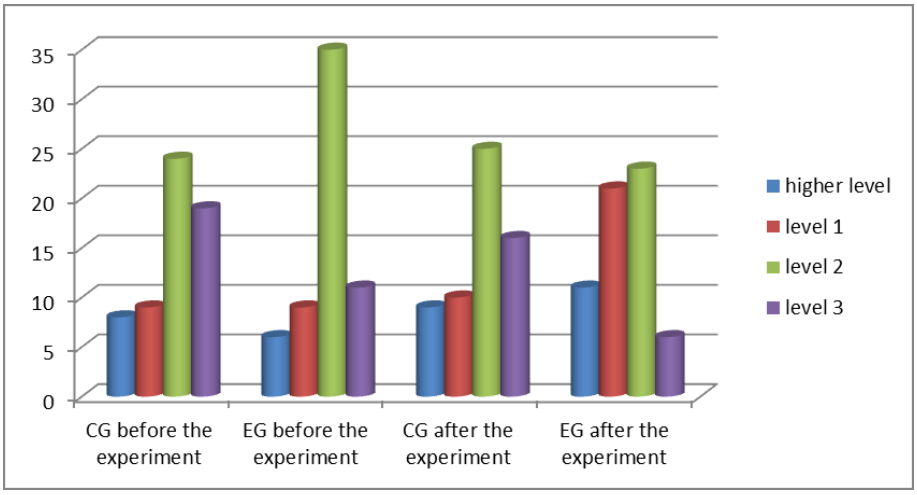


Fig. 2. *The dynamics of future officers' readiness formation to perform assigned tasks using special physical training in the experimental and control groups*

It has been proved that as a result of the experimental work, the number of students with a higher level of readiness to perform assigned tasks by means of special physical training in the experimental group increased by 8 %, while in the control group by 2%, the first level increased in the experimental group by 19 %, while in the control group – by 2%, the second level decreased: in the experimental group by 19 %, while in the

control group by 2%, the number of third-level cadets decreased in the experimental group by 8%, while in the control – 6% (see Table 3).

Table 3. *Increased readiness of future officers to perform assigned tasks using special physical training*

Levels of readiness	Cadets groups (people / percent)						The difference in gain
	EG (61 people)			CG (60 people)			
	before exp.	after exp.	dynamic	before exp.	after exp.	dynamic	
Higher level	610	11/18	+5/+8	8/13	9/15	+1/+2	+6
level 1	9/15	21/34	+12/+19	9/15	10/17	+1/+2	+17
level 2	35/57	23/38	-12/-19	24/40	25/42	+1/+2	-21
level 3	11/18	6/10	-5/-8	19/32	16/27	-3/-6	-2

Discussion

The practical value of the obtained results lies in justifying the need to develop readiness in future officers of the NGU to perform assigned tasks during their study in military higher education institutions. The main principles and conclusions of the research are planned to be implemented in the activities of such institutions. The theoretical value of the research implies the development of the content and functional model which can help to develop readiness in future officers of the NGU to perform assigned tasks.

Besides, it is expected that the acquisition of high qualification levels of special physical readiness by future officers of the NGU for the further military service will ensure combat readiness of subordinate personnel and military units as a whole, which will provide the peace and quiet in Ukraine.

The NGU professional training system provides the various types of combat and special training for the personnel. The main courses of this training are physical training, weapon training and tactical training. Under the Instruction on the organization of physical training in the National Guard of Ukraine (hereinafter referred to as the Instructions), physical training should provide the required level of readiness of the NGU servicemen to perform tasks assigned. It should also be noted that physical training is based on the specific tasks and missions performed by the different NGU military units and has a special focus on them (Leshchenia, Orlenko, Meleshko, & Zabrodskyi, 2014, p. 5). Therefore, it is called "Special Physical Training" in military units and higher military educational

institutions (HMEI). It is important that the servicemen's special physical training directly forms the individual professional competency. It is impossible to carry out military tasks without having mastered the necessary military skills. While carrying out **military tasks** by the servicemen, there is a need for specialized physical movements that are developing and refining during training on the Special Physical Training (SPT), as well as conducting various forms of physical training.

According to the results of the research (Khatsaiuk, 2008), it has been experimentally confirmed that at the stage of in-depth specialization (3-4 years of study at the HMEI), the time comes when the military-applied skills and technical preparation from hand-to-hand combat (HHC) are formed on a certain intermediate qualification level. They, however, do not fully ensure a reliable readiness for the assignment under different conditions of service and combat activities of such servicemen. Therefore, precisely at this stage, there are preconditions for optimization of motor actions with the help of MTMT, which in turn will accelerate the increase of the level of special physical preparedness and in a certain way will improve professional competency of servicemen in general.

This fact provides the grounds for supplementing the arsenal of the means necessary for organizing the training process with SPT, as well as theoretically justifying the need for a purposeful integrated influence of the means of urgent information (MTMT) on the leading sensory systems of the organism that are involved in regulating the actions of future officers during their performing assigned tasks.

Conclusions

Analyzing the results obtained during the pedagogical experiment, it was established that all conditions of the experiment were sustained. Experimental work has positively influenced the increase of the level of special physical preparedness and readiness of servicemen to perform assigned tasks. It is noted that these changes have more to do with EG students compared to CG, and these changes are statistically significant.

The results of the control diagnosis showed that as a result of the experimental work, the number of students with a higher level of readiness to perform assigned tasks by means of special physical training in the experimental group increased by 8%, while in the control group by 2%; the first level increased: in the experimental group by 19%, while in the control group – by 2%, the second level decreased: in the experimental group by 19%, while in the control group – by 2%, the number of third level cadets

was reduced: in the experimental group by 8%, while in the control group – 6%.

It should be noted that the unsatisfactory level of special physical readiness of cadets, such as EG and CG has not been observed. The reliability of the obtained results is confirmed by the verification methods using the criterion χ^2.

Consequently, the purpose of the development and implementation of the content and functional model for forming future officers' readiness to perform assigned tasks using SPT at the HMEI has been achieved.

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