Methods for assessing the readiness level of an educational institution for military training of citizens according to the program of reserve officers

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Abstract

The article studies the need to introduce new approaches to the organization of citizens' military training in educational institutions. Training is provided by a program of a reserve officer with conditioned needs of the security and defence forces of the state in well-trained young offices. This requires a sound approach to improving their system of military training, which is not possible without the use of appropriate scientific and methodological apparatus to assess the level of readiness of the educational institution to conduct military training. The article describes the method of assessing the level of readiness of an educational institution for military training of citizens according to the program of reserve officers, which allows taking into account the influence of training subjects on the training of military training objects. Indicators that have a direct impact on the level of readiness of an educational institution for military training include the level of military training planning, the level of provision of resources for military training measures, and the level of qualification of research and teaching staff. This technique allows quantifying the level of readiness of the educational institution to conduct military training of citizens according to the program of reserve officers, as well as to identify "weaknesses" in the activities of training entities during its organization, which necessitates the development of recommendations to improve their work.

Key words: evaluation indicators, military training, readiness of the educational institution, training subjects, reserve officers.

Introduction

Recent events in the world have shown the manifestations of new challenges and threats to Ukraine, in particular, the reality of the threat to the territorial integrity and sovereignty of the country. With the advent of new means of armed struggle, forms and methods of using troops (forces) has significantly expanded the range and content of tasks involving security and defense forces, which in turn requires a set of measures to improve their training system. One of the types of training is staff training, which includes training in higher military educational institutions (military educational units of higher education institutions). It is in these educational institutions that military training of citizens is carried out according to the program of reserve officers. It is carried out in order to provide the security and defense forces with the necessary number of citizens to perform military service in the reserve, to perform military service under a contract or by conscription of officers, to serve in the military reserve.

To overcome existing and potential threats to national security, there is a need to train qualified reserve officers.

The readiness of an educational institution to conduct their training has a direct impact on the level of individual abilities acquired by them.

This encourages for the searching and implementation of new approaches to the

organization of military training of citizens under the program of reserve officers. Therefore, there is a need for scientific substantiation of the method of assessing the level of readiness of the educational institution for military training of citizens according to the program of reserve officers. This indicates the relevance of the topic under consideration.

Material and methods

Analysis of the previous research and publications in this area (Heorhadze, O., Horbenko, S., Kharabara, V., 2015; Heorhadze, O., 2016; Heorhadze, O., Kharabara, V., 2019; Heorhadze, O., Ctolynets, S., Yuriev, O., 2019; Heorhadze, O., Barhylevych, A., 2020; Heorhadze, O., Shevchuk, V., Pampukha, I., Nikiforov, M., Barhylevych, A., 2020; Hohoniants, S., Heorhadze, O., Rudenko, E., 2020; Hrom, V., Heorhadze, O., Yakimenko, I., 2016; Vynokurov, D., Heorhadze, O., 2020) shows that there is no single method of assessing the level of readiness of an educational institution for military training of citizens according to the program of reserve officers. The approaches that are available relate mainly to some components of combat training.

Thus, in the previous article the author (Heorhadze, O., Horbenko, S., Kharabara, V., 2015) considered the methodical approach to assessing the quality of the program of the individual servicemen of artillery units training. The analytical dependences offered in the article (Heorhadze, O., Ctolynets, S., Yuriev, O. (2019) allow taking into account the influence of training leaders on the quality of combat coordination activities in the artillery brigade. In the previous author's studies (Heorhadze, O. 2016) the approach to estimate the level of resources supply for combat training of the military units was defined.

In the article (Hohoniants, S., Heorhadze, O., Rudenko, E. 2020) analyzes the architecture and classification of expert training systems for the training of military specialists, which can be used for their training.

These articles (Heorhadze, O., Kharabara, V. 2019; Vynokurov, D., Heorhadze, O. 2020) present an approach to assessing the competencies of servicemen.

The paper (Hrom, V., Heorhadze, O., Yakimenko, I. 2016) presents a methodical approach to assessing the level of motivation of servicemen during combat training. The articles (Heorhadze, O., Barhylevych, A. 2020; Heorhadze, O., Shevchuk, V., Pampukha, I., Nikiforov, M., Barhylevych, A. 2020) set out the procedure for evaluating the effectiveness of training a separate territorial defense brigade.

At the same time, the scientific and methodological apparatus developed by the predecessors becomes the fundamental basis for the further improvement and can be used as a part during the assessment of the level of readiness of the educational institution for military training of citizens according to the program of reserve officers.

Thus, the aim of the article is to develop a methodology for assessing the level readiness of the educational institution for military training of citizens according to the program of reserve officers which is based on the multicriteria dimensionless assessment estimates.

Results and discussion

It is proposed to assess the level of readiness of an educational institution for military training of citizens according to the reserve officers $C_R(t)$ program according to an indicator that takes into account the activities of training entities (educational institution management and research and teaching staff directly responsible for organizing and conducting military training), that are aimed at planned, systematic and comprehensively provided training of military training facilities (citizens who study under the program of reserve officers).

The quality of military training planning, the adequacy of the resources of military training measures and the qualification of scientific and

pedagogical staff who will conduct classes have a direct impact on the readiness of an educational institution for military training of citizens according to the reserve officers' program.

Thus, the indicators that characterize the level of readiness of the educational institution for military training of citizens under the program of reserve officers include: planning of military training by training entities, provision of resources for military training and qualification of research and teaching staff.

Given that the planning of military training by the subjects of training does not depend on the provision of resources for military training and qualification of research and teaching staff, and therefore their indicators are not dependent on each other, to calculate the level of readiness of the institution for military training the program of reserve officers $C_R(t)$ we use additive aggregation:

$$C_R(t) = K_P(t) \cdot q_P + K_A(t) \cdot q_A + K_Q(t) \cdot q_Q, \quad (1)$$

Where $K_P(t); K_A(t); K_Q(t)$ – indicators that characterize the level of planning of military training, the level of provision of resources for military training and the qualification of research and teaching staff at a discrete point in time;

$q_P; q_A; q_Q$ – weight coefficients of indicators of military training planning by training subjects, provision of resources of military training measures and qualification of scientific and pedagogical workers.

The calculation of weights of indicators is carried out by the method of expert evaluation.

It is proposed to assess the level of military training planning $K_P(t)$ by an indicator that takes into account the quality of the Military Training Program.

The quality of the Military Training Program characterizes the influence of the training subjects on its content. It depends on the quality factor of the program r of the training module, classes of which are conducted during military training. Thus, the assessment of the level of planning of military training $K_P(t)$ is calculated depending on:

$$K_P(t) = \sum_{r=1}^{R} Q_{Pr}(t) \cdot q_r, \quad (2)$$

Where $Q_{Pr}(t)$ – the coefficient of quality of the Program r of the training module, classes of which are conducted during military training;

q_r – weighting factor r of the training module, classes of which are conducted during military training;

R – number of training modules in the Military Training Program.

That is, the quality factor r of the Training Module Program $Q_{Pr}(t)$ and the weighting factor of the training module q_r will determine the contribution of the r training module from which the classes are conducted to the assessment of the level of military training planning.

The quality coefficient of the Training Module r Program $Q_{Pr}(t)$ is proposed to be determined based on the experience of conducting military training of citizens according to the program of reserve officers. Let's assume that:

$Q_{Pr}(t)$=0,95 – if the content of the program of the training module r, taking into account the time for training and the ultimate goal corresponds to the course of military training of citizens according to the program of reserve officers;

$Q_{Pr}(t)$=0,8 – if the content of the training module r of the blocks "General Military Training" and "Organization and methods of working with personnel" taking into account the time for training and the ultimate goal does not fully correspond to the course of military training of citizens according to the program of reserve officers;

$Q_{Pr}(t)$=0,6 – if the content of the program of the training module r of the units "Tactical and tactical-special training" and "Military-technical and military-special training" taking into account the time for training and the ultimate goal does not fully correspond to the course of military training of citizens according to the reserve officers program;

Determination of weight coefficients q_r is carried out by the method of pairwise comparisons. This method has a number of advantages over other methods. Thus, it is convenient to make a pair comparison not only

when there are a large number of modules and classes, but also when it is difficult to determine the advantage of one training module over another. To process the opinions of experts obtained by the method of pairwise comparisons, it is most appropriate to use the mathematical method of L. Thurston.

Substituting the value of the quality factor of the Program r training module $Q_{Pr}(t)$ and weighting factor q_r in the formula (2) you can find the value of the level of military training planning.

It is proposed to assess the level of provision of military training resources $K_A(t)$ with an indicator that takes into account the adequacy of the provision of military training resources.

The indicators of the provision of resources for military training measures include: the provision of military training measures with weapons and military equipment; provision of military training measures with material and technical means and provision of military training measures with training material and technical base.

Since the provision of military training measures with weapons and military equipment does not depend on the provision of material and technical means and training material and technical base, and therefore their indicators are independent of each other, to assess the level of provision of military training measures $K_A(t)$ it is proposed to use additive aggregation:

$$K_A(t) = L_W(t) \cdot q_W + L_M(t) \cdot q_M + L_T(t) \cdot q_T, \quad (3)$$

Where $L_W(t); L_M(t); L_T(t)$ – indicators that characterize the provision of military training measures with weapons and military equipment, material and technical means and training material and technical base;

$q_W; q_M; q_T$ – weights of indicators $L_W(t); L_M(t); L_T(t)$.

The indicator "provision of armaments and military equipment" $L_W(t)$ characterizes the provision of military training measures with technically serviceable armaments and military equipment. It is proposed to calculate it depending on the weapons and military equipment used during military training activities with their regular needs, taking into account the importance of the y type of weapons and military equipment:

$$L_W(t) = \frac{\sum_{y=1}^{Y_B} O_{Wy} \cdot q_y}{\sum_{y=1}^{Y_P} O_{Wy} \cdot q_y}, \quad (4)$$

Where Y_B – the number of weapons and military equipment used during military training;

Y_P – the total number of weapons and military equipment required for quality military training;

q_y – weighting factor of importance y of the type of armament and military equipment;

O_{Wy} – index of the availability y of weapons and military equipment.

$$O_{Wy} = \begin{cases} 1, & yes \\ 0, & not \end{cases} \quad (5)$$

The indicator "provision of military training measures with material and technical means" $L_M(t)$characterizes the adequacy of providing military training measures with material and technical means.

Its calculation is proposed to be carried out according to the dependence, which takes into account the material and technical means used during military training activities with their necessary needs, taking into account the importance of the *x*-th type of material and technical means:

$$L_M(t) = \frac{\sum_{x=1}^{X_B} O_{Mx}(t) \cdot q_x}{\sum_{x=1}^{X_P} O_{Mx}(t) \cdot q_x}, \quad (6)$$

Where X_B – the number of types of material and technical means used during military training;

X_P – the total number of types of material and technical means necessary for the quality of military training;

q_y – weighting factor of importance *x*-th type of material and technical means;

O_{Mx} – index of availability of the *x*-th type of material and technical means.

$$O_{Mx} = \begin{cases} 1, & yes \\ 0, & not \end{cases} \quad (7)$$

The indicator "provision of military training measures with training material and technical base" $L_T(t)$ characterizes the ability of educational facilities (areas, landfills, military property) to prepare citizens to perform tasks (exercises, standards) in accordance with the Military Training Program.

The training material and technical base used during the military training of citizens under the program of reserve officers includes: field $O_F(t)$, command $O_B(t)$ and company training material $O_C(t)$ and technical base, which are taken as indicators. The calculation of the indicator "provision of military training measures with training material and technical base" is proposed to be calculated depending on:

$$L_T(t) = O_F(t) \cdot q_F + O_B(t) \cdot q_B + O_C(t) \cdot q_C, \quad (8)$$

Where $O_F(t); O_B(t); O_C(t)$ – indicators that characterize the ability of educational facilities (areas, landfills, military property) field, barracks and company training facilities to ensure the preparation of citizens to perform tasks (exercises, standards) in accordance with the Military Training Program;

$q_F; q_B; q_C$ – weights of indicators $O_F(t); O_B(t); O_C(t)$.

The calculation of the values of indicators $O_F(t); O_B(t); O_C(t)$ is proposed to be carried out according to the dependencies that take into account their available number from the total number, determined by the relevant regulations:

$$O_F(t) = \frac{\sum_{d=1}^{D_B} Q_{Fd}(t) \cdot q_d}{\sum_{d=1}^{D_P} Q_{Fd}(t) \cdot q_d}, \quad (9)$$

$$O_B(t) = \frac{\sum_{d=1}^{D_B} Q_{Bd}(t) \cdot q_d}{\sum_{d=1}^{D_P} Q_{Bd}(t) \cdot q_d}, \quad (10)$$

$$O_C(t) = \frac{\sum_{d=1}^{D_B} Q_{Cd}(t) \cdot q_d}{\sum_{d=1}^{D_P} Q_{Cd}(t) \cdot q_d}, \quad (11)$$

Where $Q_F(t); Q_B(t); Q_C(t)$ – indicators that characterize the number d of educational facilities (areas, landfills, military property) field, barracks and company training facilities capable of preparing citizens to perform tasks (exercises, standards) in accordance with the Military Training Program;

q_d – weighting factor of importance of the d-th educational object (area, landfill, military property) of the training material and technical base;

D_B – the number of educational facilities (areas, landfills, military property) training facilities capable of preparing citizens to perform tasks (exercises, standards) in accordance with the Program of military training;

D_P – the total number of educational facilities (areas, landfills, military property) of the training material and technical base is determined by the relevant regulations.

It is proposed to determine the level of qualification of scientific and pedagogical workers $K_Q(t)$ by an indicator that takes into account their ability to perform functional duties. Its calculation is based on the dependence, which takes into account their methodological training, their combat experience and their ability to use information and communication technologies:

$$K_Q(t) = L_{MT}(t) \cdot q_{MT} + L_{CE}(t) \cdot q_{CE} + L_S(t) \cdot q_S, \quad (12)$$

Where $L_{MT}(t); L_{CE}(t); L_S(t)$ – indicators that characterize the level of their methodological training, their combat experience and their ability to use information and communication technologies;

$q_{MT}; q_{CE}; q_S$ weights of indicators $L_{MT}(t); L_{CE}(t); L_S(t)$.

The indicators that characterize the level of methodological training of research and teaching staff include: the level of their competencies in training modules, experience in their classes and the availability of advanced training courses to improve pedagogical skills. As the specified indicators do not depend on each other, for calculation of a level of methodical preparation of scientific and pedagogical workers $L_{MT}(t)$ it is offered to use additive aggregation:

$$L_{MT}(t) = O_{Co}(t) \cdot q_{Co} + O_E(t) \cdot q_E + O_{CQ}(t) \cdot q_{CQ}, \quad (13)$$

Where $O_{Co}(t); O_E(t); O_{CQ}(t)$ – indicators that characterize the level of their competencies in training modules, experience in their classes and the availability of advanced training courses to improve pedagogical skills;

$q_{Co}; q_E; q_{CQ}$ – weights of indicators $O_{Co}(t); O_E(t); O_{CQ}(t)$.

Assessment of the level of competencies of research and teaching staff in training modules $O_{Co}(t)$ is proposed to determine the indicators that characterize their level of theoretical knowledge and practical skills in training modules. The calculation of the value of the

level of competencies of research and teaching staff in the training modules $O_{Co}(t)$ is determined by:

$$O_{Co}(t) = Q_{TK}(t) \cdot q_{TK} + Q_{PS}(t) \cdot q_{PS}, \quad (14)$$

Where $Q_{TK}(t); Q_{PS}(t)$ indicators that characterize the level of theoretical knowledge and practical skills of research and teaching staff in training modules;

$q_{TK}; q_{PS}$ – weights of indicators $Q_{TK}(t); Q_{PS}(t)$.

Determination of weights $q_{TK}; q_{PS}$ is carried out by the method of expert evaluation. The indicator that characterizes the level of theoretical knowledge of research and teaching staff $Q_{TK}(t)$ is proposed to be calculated based on the results of theoretical questions (testing) from training modules. The total number of questions should provide an objective and comprehensive assessment.

Assessment of the level of theoretical knowledge of scientific and pedagogical workers$Q_{TK}(t)$ is determined by the expression:

$$Q_{TK}(t) = \frac{X_T}{X_Q}, \quad (15)$$

Where X_T – the number of correct answers provided by research and teaching staff;

X_Q – the total number of theoretical questions, which was tested by research and teaching staff.

The indicator that characterizes the level of practical skills of research and teaching staff $Q_{PS}(t)$ is calculated based on the results of their practical tasks from the training modules.

Assessment of the level of practical skills of research and teaching staff $Q_{PS}(t)$ is determined by the expression:

$$Q_{PS}(t) = \frac{Z_C}{Z_T}, \quad (16)$$

Where Z_C – the number of tasks performed by research and teaching staff;

Z_T – the total number of tasks, which was tested by research and teaching staff.

The indicator "experience in conducting classes" characterizes the ability of research and teaching staff to prepare and conduct classes. It is proposed to calculate it depending on the dependence, which takes into account the practical experience gained by them in the role of class teacher, which they conducted over the past three years:

$$O_E(t) = \frac{H_C}{H_T \cdot e^{\left(\frac{H_C - H_T}{H_T}\right)}}, \quad (17)$$

Where H_C – the number of military training activities carried out by research and teaching staff over the past three years;

H_T – the total number of activities (military training, which is designated for research and teaching staff according to the schedule of classes, during the last three years.

The indicator "availability of advanced training courses to improve pedagogical skills" of scientific and pedagogical workers $O_{CQ}(t)$ characterizes the availability of advanced training courses to improve pedagogical skills. To assess the availability of advanced training courses to improve pedagogical skills, we have developed an assessment scale, which is given in table. 1.

Table 1 – Scale for assessing the availability of research and teaching staff refresher courses to improve pedagogical skills

Passing of advanced training courses on improvement of pedagogical skill	Rating in points
during the last year	5
for two years	4
for three years	3
for four years	2
over four years	1
did not participate	0

This indicator is evaluated in points, so its value is reduced to a dimensionless value using the expression:

$$O_{CQ}(t) = \frac{Q_{CQ}(t)}{5}, \quad (18)$$

Where $Q_{CQ}(t)$ – assessment in points of availability of scientific and pedagogical workers of advanced training courses on improvement of pedagogical skill.

The indicator "presence of combat experience in scientific and pedagogical workers" $L_{CE}(t)$ characterizes the presence of combat experience in them. To assess the availability of combat experience, we have developed an assessment scale, which is given in table. 2.

Table 2 – Scale for assessing the availability of research and teaching staff combat experience

Participation in hostilities	Rating in points
for the last five years	5
for ten years	4
for twenty years	3
for thirty years	2
over thirty years	1
did not participate	0

To reduce the value of this indicator to a dimensionless value, use the expression:

$$L_{CE}(t) = \frac{O_{CE}(t)}{5}, \quad (19)$$

Where $O_{CE}(t)$ – assessment in points of availability of scientific and pedagogical workers of combat experience.

The indicator "ability of scientific and pedagogical workers to use information and communication technologies" $L_S(t)$ characterizes their ability to use information and communication technologies.

To assess this indicator, we use the "Questionnaire of digital competence of a researcher and pedagogue" developed by UNESCO.

To translate the values of this indicator into a dimensionless value, the score obtained as a result of the Questionnaire is divided by the maximum possible score.

Conclusions

Thus, the article developed a method for assessing the level of readiness of educational institutions for military training of citizens according to the program of reserve officers, which allows to take into account the influence of training subjects on training by military training facilities, based on the choice of a new set of indicators planning of military training, adequacy of providing resources for military training measures and qualification of scientific and pedagogical workers.

Using this method, the subjects of training in the course of its organization get the opportunity to make the necessary calculations, to provide sound proposals to the head of the educational institution to make a decision on its organization.

Prospects for further research in this area may be to substantiate the recommendations for increasing the level of readiness of the educational institution for military training of citizens under the program of reserve officers.

References

Doctrine of training the state defence forces: as of January 21. 2020 – Kyiv: General Staff of the Armed Forces of Ukraine, 2020. –26 p. (Normative document of the General Staff of the Armed Forces of Ukraine. Doctrine).

Doctrine on the organization of training in the Armed Forces of Ukraine: as of 03 Jul 2020 – General Staff of the Armed Forces of Ukraine, 2020. – 34 p. (Normative document of the General Staff of the Armed Forces of Ukraine. Doctrine).

Heorhadze, O. (2016) Methods for assessing the level of resource provision for military units combat training. *Modern information technologies in the field of security and defence*. № 3 (27), P. 144–147.

Heorhadze, O., Horbenko, S., Kharabara, V. (2015) Methodical approach to assessing the quality of the artillery units individual training program. *Weapons systems and military equipment*. № 2 (42). P. 68-70.

Heorhadze, O., Kharabara, V. (2019). Partial method of assessment of tank brigade preparedness level during combat readiness recovery. *Journal of Scientific Papers "Social Development and Security"*, 9(4), 131–142. DOI: 10.33445/sds.2019.9.4.10

Heorhadze, O., Ctolynets, S., Yuriev, O. (2019) Partial methodology for assessing the methodological training level of classes' leaders during conducting the combat coordination of an artillery brigade. *Modern information technologies in the field of security and defence*. № 2 (35), P. 155–158. DOI: 10.33099/2311-7249/2019-34-1-155-158

Heorhadze, O., & Barhylevych, A. (2020). Separate brigade of territorial defence level of training organization assessment methodology. *Political Science and Security Studies Journal*, 1(1), 71–75. DOI: 10.5281/zenodo.4399732

Heorhadze, O., Shevchuk, V., Pampukha, I., Nikiforov, M., Barhylevych, A. (2020) Justification of the overall indicator for the estimation of effectiveness of training of a separate territorial defense brigade of the armed forces of Ukraine. *Collection of scientific works of the Military Institute of Kyiv National Taras Shevchenko University*. № 68, P. 100–109.

Hohoniants, S., Heorhadze, O., Rudenko, E. (2020) Architecture and classification of expert-educational systems for training of military specialists. *Modern information technologies in the field of security and defence*. No 2 (38), P. 133–138. DOI: 10.33099/2311-7249/2020-38-2-133-138

Hrom, V., Heorhadze, O., Yakimenko, I. (2016) Methodical going is near evaluation of level of motivation of servicemen of the armed forces of Ukraine. *Research papers collection of the Center of military and strategic studies of the National Defense University of Ukraine by Ivan Cherniakhovskyi*, 57 (2), P. 67–70. DOI: 10.33099/2304-2745/2016-2-57/67-70

Vynokurov, D., & Heorhadze, O. (2020). Partial methodology for assessing the younger specialists competence level in the training center. *VUZF Review*, 5(1), 50–53. DOI: 10.38188/2534-9228.20.1.07