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**METHODOLOGICAL ASPECTS TO ASSESSING THE TRAINING OF  
SCIENTIFIC RESEARCHERS OF SCIENTIFIC INSTITUTIONS IN THE SYSTEM  
OF THE MINISTRY OF DEFENCE OF UKRAINE**

**V. V. Larin\*, V. P. Hmyria\*\*, L. V. Romanovskya\*\*\***

*The article deals with the main aspects of training of PhD graduates in the scientific institutions of the Ministry of Defense of Ukraine. The authors analyze the regulatory framework for improving the professional competence of scientific personnel of scientific institutions in the system of the Ministry of Defense of Ukraine. The national security of Ukraine is an integral part and priority goal of the Ministry of Defense of Ukraine, which accordingly determines the main factors of stable development of society. Russia's full-scale invasion of Ukraine has created the conditions for the emergence of a hybrid form of warfare using the information space, which has forced the creation of new approaches to ensuring and maintaining the national security of the state. In this case, an important role is played by weapons and military equipment, which requires constant updating. Therefore, in order to timely take into account and forecast the production of weapons and military equipment, the Ministry of Defense of Ukraine needs graduates of the adjunct program who are able to conduct basic research in the field of defense. The issue of training PhD graduates in the modern conditions of the contemporary educational process should focus on the ability to make decisions in a state of uncertainty. In today's conditions, the future model of education provides for the possibility of choosing a solution that can be modeled as a situation of choosing the best solution from a set of equivalent, random solutions.*

*The level of education of a PhD candidate will be higher, the wider the chosen field of activity and field of knowledge, as well as the ability to design solutions in an uncertain situation, which will allow them to have a wider range of possible decision-making methods. Therefore, the introduction of a*

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\* Candidate of Technical Sciences (PhD in Technology and Engineering), Associate Professor  
(State Scientific Research Institute of Armament and Military Equipment Testing and  
Certification)

l\_vv83@ukr.net

ORCID: 0000-0003-0771-2660

\*\* Candidate of Economic Sciences (PhD in Economics), Associate Professor, Leading Research  
Scientist

(State Scientific Research Institute of Armament and Military Equipment Testing and  
Certification)

viktoryagmirya@ukr.net

ORCID: 0000-0003-3070-0158

\*\*\* Senior Researcher

(State Scientific Research Institute of Armament and Military Equipment Testing and  
Certification)

ludmila08romanovska@gmail.com

ORCID: 0009-0002-7284-1493

system of training PhD candidates through adjuncture will create prerequisites for further implementation of measures that will ensure the development of science in the system of higher military education.

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**Keywords:** staff, scientific institutions, competencies, algorithm, education, evaluation indicators.

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## **МЕТОДОЛОГІЧНІ АСПЕКТИ ОЦІНЮВАННЯ ПІДГОТОВКИ НАУКОВИХ ПРАЦІВНИКІВ НАУКОВИХ УСТАНОВ СИСТЕМИ МІНІСТЕРСТВА ОБОРОНИ УКРАЇНИ**

**В. В. Ларін, В. П. Гмря, А. В. Романовська**

*В науковій статті розглянуто основні аспекти підготовки здобувачів доктора філософії в наукових установах системи Міністерства оборони України. Проаналізовано нормативні засади підвищення професійної компетентності наукових кадрів наукових установ в системі Міністерства оборони України. Національна безпека України є невід'ємною складовою і пріоритетною ціллю Міністерства оборони України, що відповідно визначає основні фактори стабільного розвитку суспільства. Повномасштабне вторгнення росії на територію України створило умови появи гібридної форми ведення війни із застосуванням інформаційного простору, що змусило створити новітні підходи до забезпечення та підтримання національної безпеки держави. Важливу роль в даному випадку відіграють озброєння і військова техніка, яка потребує постійного оновлення. Тому для своєчасного врахування та прогнозування виробництва озброєння і військової техніки Міністерство оборони України потребує випускників ад'юнктури, які здатні проводити фундаментальні дослідження у сфері оборони. Питання підготовки здобувачів доктора філософії в сучасних умовах новітнього освітнього процесу повинна орієнтуватися саме на здатність приймати рішення в стані невизначеності. В умовах сьогодення майбутня модель навчання передбачає можливість вибору рішення, яке можна моделювати як ситуацію вибору кращого рішення з множини рівнозначних, випадкових рішень. Рівень освіченості здобувача доктора філософії буде вище, чим ширша обрана сфера діяльності і галузь знань, а також можливість проектувати рішення в умовах невизначеності ситуації, що дозволить володіти більш ширшим спектром можливих способів прийняття рішень. Тому, впровадження системи підготовки здобувачів доктора філософії через ад'юнктуру створить передумови для подальшого здійснення заходів, які забезпечать розвиток науки в системі вищої військової освіти.*

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**Ключові слова:** кадри, наукові установи, компетентності, алгоритм, освіта, показники оцінювання.

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**Introduction of the issue.** The development of the state policy in the field of science and technology is the integration of science and knowledge-intensive production with the aim of prioritizing the development of scientific research and creating innovative developments in the relevant sectors of the country's activities.

Ukraine has the opportunity to approach the technological level of the developed countries of the world, but the question arises of training the intellectual potential that would ensure this development. It is higher education and research institutions that can provide training of highly qualified, intellectually

developed, professional scientific personnel.

In the context of the full-scale war waged by Russia against Ukraine, the issue of military education remains one of the country's key priorities. Military education creates the preconditions for reproducing the human resources of the Armed Forces of Ukraine and strengthening Ukraine's defense capabilities. Based on this, the issue of training of scientific personnel by the scientific institutions of the Ministry of Defense of Ukraine, which would ensure further development of the military sector and increase the country's defense capability, becomes relevant.

**Current state of the issue.** The issue of assessing the quality of military personnel training was included in the research of such well-known scholars as S. Antonenko, A. Vitchenko, O. Boyko, V. Osodlo, Y. Punda, O. Puchkov, Y. Stepaniuk and others.

**Unresolved issues brought up in the article.** The issue of evaluation and training of scientific personnel in military higher education institutions has been considered in the scientific works of many domestic scholars. However, the issue of evaluating the training of scientific personnel in the scientific institutions of the Ministry of Defense of Ukraine has not been sufficiently considered, so this study is relevant at this stage.

**Aim of research** is to determine the indicators for evaluating the effectiveness of training of scientific personnel in the scientific institutions of the Ministry of Defense of Ukraine.

**Results and discussion.** The world practice of training scientific personnel in the system of military education is clearly guided by the regularity of the development of research work in various branches and services, which is based on ensuring the national security of the country and protecting territorial sovereignty. National security is an important component of the existence and development of higher military education. Therefore, it is safe to say that higher military education in modern realities is considered not from the classical position, but from the point of view of the Armed Forces' use of the military-technical component of national security support.

Military education in the leading countries of the world is formed under the influence of the following main components: national interests of the country; ensuring the national security of the country; national requirements for the training of officers; patterns, trends and principles of military education in various fields and specializations; the purpose of higher military education; system of higher military education; financial support for higher military education; educational and qualification requirements for military personnel;

innovation and technological component of military personnel training; material and technical base for the training of scientific personnel in the military sphere; quality control of military education; monitoring of military education activities; adjustment of the process of training military specialists.

*National security* of the state is one of the cornerstone tasks of all countries of the world. The main priorities of national security can be considered as permanent and basic, which are vital and remain unchanged. One of the country's priorities in ensuring national security is the existence and dynamic development of the Armed Forces, a high degree of training of military personnel of various levels and levels of command. A mandatory requirement in the training of scientific personnel is to take into account the goals and objectives of different branches of the Armed Forces, which are determined by the military doctrine of the state, moral, psychological, material and other factors that affect the formation and performance of duties by military formations.

The main components of the system of training scientific personnel are: the legal framework that regulates the training of scientific personnel; a network of educational institutions of different levels and research institutions; and government agencies that cooperate with the armed forces to ensure national security. These components interact with each other based on certain laws, patterns, and principles. The continuity of education is quite important. However, the continuity of education is not about taking refresher courses after a certain period of time, but about self-training, i.e., writing a dissertation and obtaining a degree, since this independent work is part of combat training [1].

*The main objectives of the educational and scientific program for the training of PhD graduates in scientific institutions subordinate to the Ministry of Defense of Ukraine are:*

- increasing the country's defense capability, the authority of the army in

society, and the creation of material, intellectual and spiritual values;

- meeting the educational needs of the individual, society and the country in the training of military specialists capable of effectively performing their tasks in peacetime and wartime;

- training of specialists capable of solving significant problems of military-technical policy, taking into account the strategic course of the country;

- balancing knowledge and skills in research, testing, scientific and practical, scientific and organizational activities, as well as ensuring his professional development as a military specialist-scientist;

- improvement of the system, priority support for it as a structure that ensures the reproduction of personnel potential by military formations.

*The regularities of the educational and scientific program are predetermined:*

- educational needs of the individual;

- national interests, national security and defense interests;

- scientific and technical capabilities of the country;

- national traditions, national and international experience;

- needs of the troops;

- efficiency of management activities, coherence of functioning of all structural components;

- the state of military theoretical and testing research;

- the level of scientific and pedagogical potential and the state of the infrastructure of research institutions;

- the state of moral and psychological, financial, economic, logistical, and informational support of the system of training of scientific personnel [2].

*Structure and content of higher military education.* Most countries in Europe and the world (the United States, Japan) do not classify military education institutions according to accreditation levels and educational qualifications. Ukraine also does not have a clear division of educational institutions. Therefore, institutes may still be called, for example, military or naval schools, although they are attended by graduates

of academies who have served for several years in various officer ranks, etc. The structure of educational institutions is divided into primary military education (military lyceums, schools, military units, training centers), secondary military education (military schools, colleges, schools, academies, training centers, courses), and higher military education (military universities and academies, research institutions, courses).

The growing need for scientific training of military specialists has arisen in accordance with modern military and professional requirements that form competencies in the decision-making process and attract a higher intellectual level of military personnel [3].

The content of the educational and scientific program for the preparation of PhD graduates is formed for the future, determining the main components of the development of military education in the direction of the purpose, tasks of types and branches of the armed forces. Considerable attention is paid to innovative and integrated training when comprehensive programs are implemented based on the integration of several academic disciplines.

*The organization of training of scientific personnel in the scientific institutions of the Ministry of Defense of Ukraine is characterized by the following main components:*

- rigorous selection of personnel for studying under the educational and scientific program of preparation of applicants for the Doctor of Philosophy and the current system of expulsion of those applicants who do not timely fulfill the individual plan in the process of training;

- compliance of the content of the applicant's training with the job description, the current level of development of science and practice, training in the specialty in accordance with the levels of education and management (theoretical, practical), advanced training and retraining (including higher military education);

- application of integrated educational systems in scientific institutions,

information and communication technologies for effective training of PhD candidates;

- creation of optimal conditions for mastering knowledge, skills and abilities, careful control of the quality of education;

- compliance of material and technical, financial, informational, didactic support with the tasks of training PhD candidates.

*Considerable attention is paid to the organizational and methodological principles of training scientific staff, the use of innovative teaching technologies, integrated curricula based on information, multimedia, computer, and simulator complexes. The training of PhD candidates is carried out in a group with a small number of applicants, which allows the academic staff to pay attention to each student. Considerable attention is paid to the issue of language training of future PhD students. It is the fluency in a foreign language that creates the prerequisites for the professional development of a military scientist, namely in the context of internships in the military, or in the process of advanced training or retraining both in Ukraine and abroad. The professional qualities of a future officer-scientist are formed in accordance with the requirements imposed on officers by the military and political leadership of the country [2].*

*Organizational, pedagogical and scientific conditions for the training of future Doctor of Philosophy in scientific institutions in the system of the Ministry of Defense of Ukraine.*

Having analyzed the current state of training of highly qualified scientific personnel in the system of the Ministry of Defense of Ukraine, we note that such training is carried out by the following higher education institutions and research institutions: National University of Defense of Ukraine, National Academy of the National Guard of Ukraine, National Army Academy named after Hetman Petro Sahaidachnyi, Military Academy, Kharkiv National Air Force University named after Ivan Kozhedub, etc. In accordance with the updated approaches to educational activities at the third (educational and scientific) level

of higher education, scientific institutions should continue to train scientific personnel in military education, taking into account the changes made.

The quality training of future Doctor of Philosophy in military education depends on the organization of scientific and pedagogical conditions. First of all, a research institution should regularly carry out research and development (R&D), scientific and educational projects, etc. that require the involvement of adjuncts. Such research should determine the timing of implementation, the composition of the research topic manager and performers, and the intermediate and final results formed and specified. In addition, research must comply with the priority thematic areas approved by the research institution on the basis of which the PhD is being trained [3].

In the training of Doctor of Philosophy in the scientific institutions of the Ministry of Defense of Ukraine, an important role is played by the existing experimental base for conducting scientific research at the appropriate levels of organization of the educational and scientific process, in particular in the field of military education in the areas of training. An important condition for the quality training of Doctor of Philosophy is the involvement of leading scientists and industry experts in the scientific supervision of adjuncts.

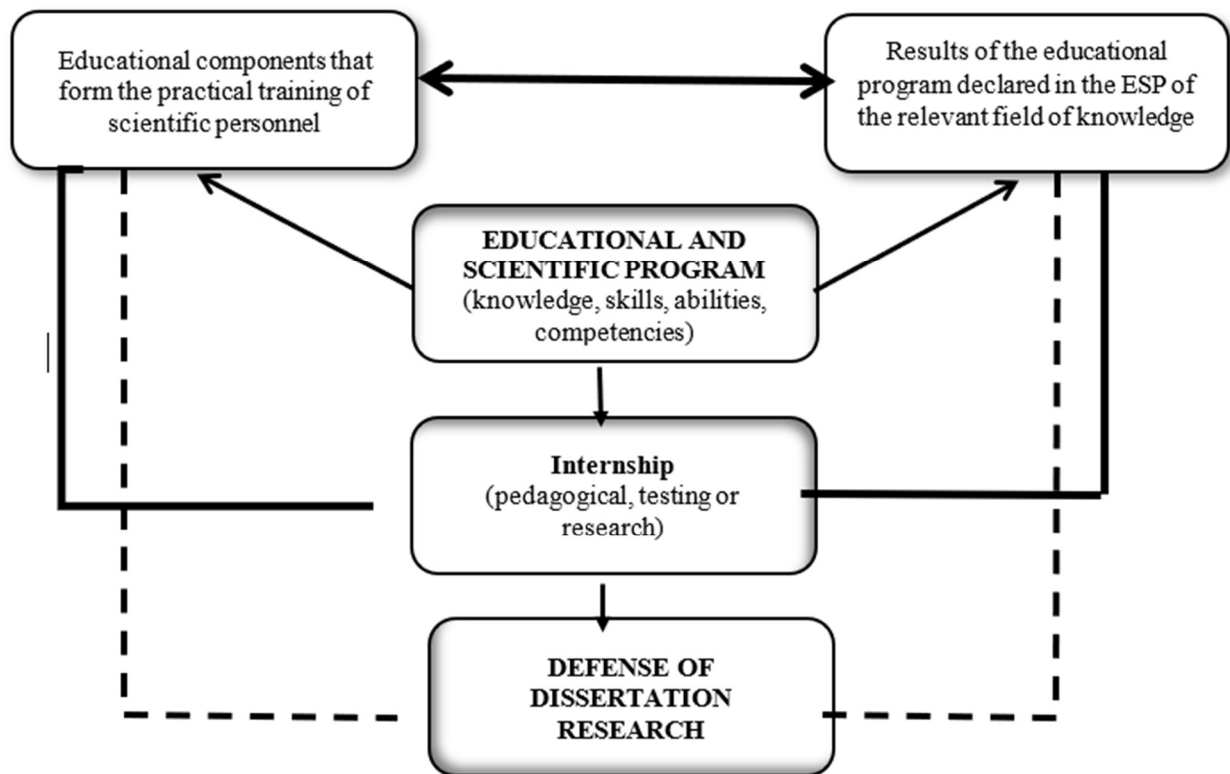
Specialists at the third (educational and scientific) level of higher education must publish research results in scientific professional publications of Ukraine or in the relevant scientific and metric databases of Scopus / Web of Sciences. In addition, a PhD candidate must be able to work with library collections and information resources that are publicly available. Particular attention in the training of future Doctor of Philosophy is paid to the testing of dissertation research results during scientific events, including the following: forums, conferences, seminars, round tables, etc.

The main criterion for the effectiveness of professional scientific training of applicants at the third (educational and

scientific) level of higher education is the quality of education – compliance of the conditions of educational activities and learning outcomes with the requirements of legislation and educational standards, professional and/or international standards (if any). In the terms of the new competency-based methodology, educational outcomes are a set of knowledge, skills and abilities, and other competencies declared in educational standards that must be mastered by a person in the process of studying a particular educational program, which can be identified, quantified, and measured. Thus, benchmark learning outcomes are programmatic learning

outcomes declared in a particular educational program. In turn, a set of knowledge, skills, abilities, and other competencies acquired by a student in the process of studying under a particular educational program are real, educational outcomes [4].

Therefore, the basis for the assessment procedure is the comparison of the knowledge, skills, abilities, and other competencies demonstrated by the applicant with the benchmark results and the establishment of an objective level of quality of training of applicants for the third (educational and scientific) level of higher education (Fig. 1).



**Fig. 1. Model for assessing the quality of scientific personnel training.**

Assessment of the quality of training of scientific personnel can be used for various purposes: to determine the scientific achievements of applicants; to determine the effectiveness of scientific institutions; to determine the effectiveness of methods and forms of organizing an educational program; to determine the effectiveness of a sound method of teaching, etc.

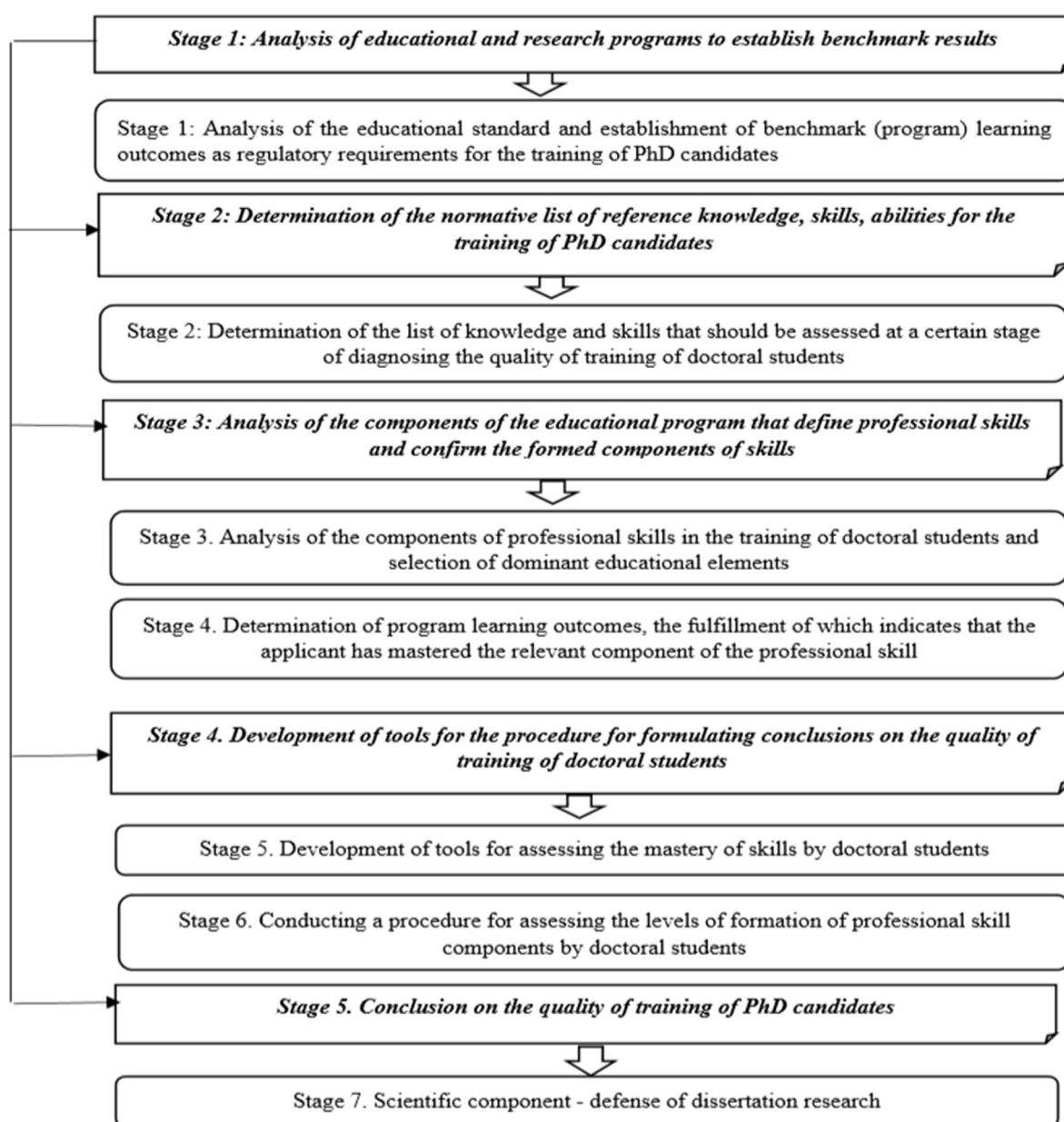
Within the framework of our study, we will assess the quality of training of applicants for the third (educational and scientific) level of higher education to determine the scientific achievements of applicants; to establish the effectiveness of scientific institutions; to establish the effectiveness of methods and forms of organization of the educational and scientific program.

It is proposed to evaluate the quality of training of scientific personnel as a logical structure that combines the main stages with the corresponding stages, which result in conclusions about the implementation of the educational program in the relevant field of knowledge (Fig. 2).

*Stage 1:* Analysis of educational and research programs to establish benchmark results. Using the content of educational and research programs in the relevant field of knowledge, we formulate the educational outcomes that PhD candidates should demonstrate at the

stage of completing the scientific component.

*Stage 2:* Determination of the normative list of reference knowledge, skills, and abilities for the training of doctoral students. At this stage, the benchmark learning outcomes are specified depending on the objectives of assessing the quality of training of PhD candidates. Learning outcomes are a kind of indicator of the competencies gradually acquired by the applicant and formulated by research and teaching staff at the level of the educational program and at the level of a particular discipline.



**Fig. 2. The algorithm for assessing the quality of training of doctoral students [2].**

*Stage 3:* Analysis of the components of the educational program that define professional skills and confirm the formed components of skills. The benchmark educational outcomes (skills, abilities) identified for assessment are aimed at performing certain professional tasks. The description of the structural components of each skill should be as detailed as possible so that there are no discrepancies in the definition of: the subject of the action, its components and features; the content and sequence of operations that make up its composition; devices and tools to be used when performing the action; conditions under which the action should be performed; results to be achieved as a result of the action and evaluated.

*Stage 4.* Development of tools for conducting the procedure for formulating conclusions about the quality of training of PhD candidates. When applying this toolkit, control tasks, tests, and other means of evaluation according to the relevant criteria are used. The criteria are determined by research and teaching staff involved in teaching disciplines at the third (educational and scientific) level of higher education.

*Stage 5.* Conclusion on the quality of training of Doctor of Philosophy candidates. Based on the results of the assessment of the competence of applicants, a conclusion is made about the compliance of the training of Doctor of Philosophy candidates with regulatory requirements. The effectiveness of the assessment of knowledge, skills and abilities, methods of verification depends entirely on the individuality of the research and teaching staff. Therefore, it

is of great interest to study the possibilities of a scientific approach to scientific and pedagogical assessment. For PhD candidates, the result of a scientific approach to assessing professional skills is the writing of a dissertation and its defense at a meeting of the Specialized Council.

**Conclusions and research perspectives.** The substantiated methodological approach to assessing the training of scientific personnel in scientific institutions in the system of the Ministry of Defense of Ukraine makes it possible to determine the real level of compliance of PhD candidates with the established regulatory requirements at all stages of mastering the educational and scientific program. The proposed approach to evaluating indicators allows developing diagnostic tools and obtaining objective results of checking the achievements of applicants. However, given the changes in the educational sphere, it can be argued that this approach is basic for a certain stage of training of PhD candidates and can be improved in accordance with the requirements of the educational process.

The prospects of our research are outlined in the focus of research on the methodology for assessing the effectiveness of training of scientific personnel, considering the information-analytical and testing stages of preparation of the dissertation research of PhD candidates, which will facilitate the prompt implementation of information-analytical and practical support of any scientific activity by PhD candidates in scientific institutions of the Ministry of Defence of Ukraine.

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