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THEORETICAL AND METHODOLOGICAL BASES OF THE FORMATION OF INFORMATIONAL CULTURE OF CADETS

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Abstract

The paper discusses approaches to solving the problem of the formation of information culture engineer as a part of the general culture and the basis of the system of competencies, which ensure optimal informational activity aimed at meeting informational needs with using informational and communication technologies in the process of information training of cadets of engineering specialties of military educational institutions of higher education. Despite the awareness of the importance of personal informational culture in modern researches and developments are not sufficiently covered and the contradictions between requirements of state informational security and the need to ensure informational security of the person; tendencies of development and realities of the information society; social order and the objective need to prepare a competent military engineer with a high level of informational culture. The obtained intermediate results on the experimental assessment of the level of information culture of cadets allow to conclude about highly probable confirmation of hypothesis that the implementation of universal, general professional and professional competences in the process of targeted information training of engineering cadets based on the integration of humanitarian, socio-economical, natural science, and general knowledge and professional disciplines will provide the formation of cognitive, communicative, operational-content and value-reflexive components of the information culture of future military engineers, which is an essential condition for successful adaptation in the modern information society and a guarantee of the effective professional activity of the future military specialist.

Keywords: Informational culture, informational training, professional competences.

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1. Introduction

The modern period of civilization development characterizes by systemic changes that contribute to the transformation of the information society into a smart society, which use successfully the "potential of digital technologies and connected devices ... digital networks to improve people's lives" (Haupt, 2017, sector 1). At the same time, the researchers note that the presence of an Internet connection was not the only criterion for smart technologies. The key component of this is people with the appropriate consciousness and behavior (Ardashkin, 2017). From the presented concept follows the priority of special training for successful functioning in various fields of activity, including in the process of modernization of the army and navy.

2. Problem Statement

Military experts and researchers of information security problems point out that the effectiveness of modern weapons is determined not only by technical characteristics, but also by the degree of information interaction and the level of development of software for automated military systems and the personnel potential of the Armed Forces. In FY 2017 Program Acquisition Cost by Weapon System (2016) is emphasized that due to the increasing exchange of information, distributed units can communicate, manoeuvre, ... successfully accomplish assigned tasks more effectively. Those military specialists who are not competent in methods of working with computer equipment and electronic resources, computing, telecommunications and social networks, who cannot quickly search, structure, analyze and transmit information, form and protect databases, are unlikely to be useful to the army and the state.

An important component of the professional activity of a military engineer is the ability to analyze and critically evaluate incoming information, to confront information challenges and threats caused by digitalization processes and the exponential growth of information volumes; reduction of time for delivery and processing of information; ease of manipulation, transformation and reproduction of information; the totality of the information space, including controls; the inclusive nature of the information impact; the sharply increased possibilities of manipulating the consciousness and behavior of people, bringing the impact on human consciousness to the level of technology (Information Security Threats, 2019).

Nowadays, since the moment of emergence of network technologies, the greatest threat to information security is unauthorized access to computer networks, network equipment and information systems (Threats in 2019, 2019), including automated special-purpose systems that control modern means of warfare and defence. However, the danger is not only direct intervention in the work of equipment and software, but also information wars. Informational wars are "open and hidden targeted informational effects of systems on each other in order to use, destroy or distort enemy information, protection of information against such actions", which part are informational and psychological wars as "a method of influencing on the public consciousness of the population and the personnel of the armed forces of the enemy" (Laminina, 2018, p. 18).

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With an adequate and timely response to information calls and with the prevention and successful neutralization of information threats, specialists working in the information space can not only maintain their current position, but also reach a new, higher level of development. One of the key conditions for fulfillment of these requirements is that future officers have an information culture as a mechanism for an individual to adapt to difficult situations and "a resource for ensuring personal security in an informational society" (Pirogov & Zavalnev, 2014, p. 126).

In foreign studies, the concept of information culture is considered in various aspects - psychological, linguistic, social, legal, economic, pedagogical, and also from the standpoint of various approaches - sociotechnical, cultural and informational (Tredinnick, 2008; Mittermeier, 2005; Virkus, 2012; Zheng, 2005 etc.). In accordance with the information approach, an information culture is understood as a set of knowledge, skills and abilities to search, select, store, process, analyze and transmit information, that is, everything that is included in information activities aimed at satisfying information needs. Information Literacy is also a similar concept (Guidelines On Information Literacy For Lifelong Learning, 2006).

At the turn of the 20th — 21st centuries in the Russian Federation was defined a strategy for the formation of an information culture of an individual and was developed a program of the basic course "Basics of Information Culture", which has an integrative character (Gendina, Kolkova, & Starodubova, 2006). The goals and objectives of the course were differential depending on the category of trainees, and the structure and content corresponded to the modern level of development of society and technology.

In the same period, scientists of the higher military school explored ways to create optimal conditions for the formation of information culture of cadets, emphasizing the role of informatics and information and communication technologies in the training of personnel for the modern Armed Forces. The identified approaches to the essence of information culture make a significant contribution to the development of the problem of the formation and development of information culture of future military engineers, but they do not solve it taking into account the current state of the information society, requirements for the level of knowledge and preparedness of graduates of higher education institutions of the Russian Ministry of Defence in the field of information and communication technologies and features of training cadets of military universities in engineering specialties. Despite the awareness of the importance of personal informational culture and the reflection of various aspects of its formation in a large number of publications, in modern researches and developments are not sufficiently covered and the contradictions between:

- requirements of state informational security and the need to ensure informational security of the person;

- tendencies of development and realities of the information society, reflecting an increase of the degree of communication through social networks and technologies, and restrictions on the dissemination of information imposed on military personnel;

- social order and the objective need to prepare a competent military engineer with a high level of informational culture as the basis of informational security of a person, and the lack of development of theoretical and methodological foundations for the formation of informational culture of cadets in the educational process of military educational organizations of higher engineering education.

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Thus, an analysis of the literature has shown that currently there is no holistic research devoted to the development of theoretical foundations and methodological approaches to the process of forming an informational culture of cadets of engineering specialties of higher military educational organizations and the elimination of the above contradictions. Consequently, the problem of the study lies in the theoretical and methodological justification of the basic principles, optimal organizational forms, teaching methods, activity tools, and application software tools for the formation of various components of the future military engineer's informational culture.

3. Research Questions

So, the following research questions formulated:

To analyze the current state of scientific and pedagogical researches and educational and methodological developments on the problem of cultural personality in the conditions of the modern level of development of the information society.

To characterize the informational professional activity and the current state of informational training of cadets as future military specialists in the context of the requirements of the third generation of Federal educational standards.

To develop and justify theoretically a model for the formation of an information culture of cadets of engineering specialties in the conditions of integration of humanitarian, socio-economic, natural science, general professional and professional disciplines; to identify the pedagogical conditions and principles of the formation of the informational culture of future military engineers.

To develop methodological recommendations for the implementation of an interdisciplinary approach in the process of forming the cognitive, communicative, operational-content and value-reflexive components of the informational culture of future military engineers.

Develop and theoretically justify the tools and methods for determining the level of information culture of cadets of engineering specialties of higher military educational organizations.

4. Purpose of the Study

The purpose of the study is theoretical justification of the basic principles and directions of development of information culture of engineering cadets, the development of methodological approaches to the formation of information culture of the future military engineer in the context of the development of a modern information society.

5. Research Methods

To solve the tasks, the following research methods were used: theoretical analysis of scientific literature on philosophical, social, psychological and pedagogical problems related to the influence of the information society on personal development, the formation of information culture, analysis of regulatory documents and teaching materials, pedagogical modelling, questioning, expert assessment method, ranking, pedagogical experiment.

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6. Findings

The analysis of the pedagogical literature made it possible to reveal the absence of a unified approach to the definition of the essence and content of the concept of informational culture; to determine the informational culture of the future military engineer as a part of the general culture and the basis of the system of competencies which ensure optimal informational activity aimed at meeting informational needs with using informational and communication technologies.

As a result of the analysis of the Federal State Higher Education Standards of the third generation in the specialties of training courses for cadets "Computer Science and Computers", "Electronics, Radio Engineering and Communication Systems" and professional standards of group 06 "Communication, information and communication technologies", there was established the correspondence of universal and general professional competencies of graduates concerning their informational activities.

The analysis of regulatory documents and teaching and methodological support revealed that for improving the quality of military engineering education and for preparing for the information activities of a future military specialist, targeted information training of cadets is necessary, taking into account the realities of the modern information society and peculiarities of information processes in the military-professional sphere, based on integration of the content, forms, methods of humanitarian, natural science, substantive and professional disciplines (Kozlov & Undozerova, 2017).

As a result of the research, there were defined theoretical approaches that form a single, indivisible methodological complex and establish fundamental principles which let us to form general ideas about the process of forming an information culture of a cadet and outline the leading directions of its development: active, informational, competence, personality-oriented, interdisciplinary, synergistic, system and technological.

As a result of pedagogical modeling, a structural-informative model of the formation of an information culture of engineering cadets has been developed (Figure 01), which includes the following blocks: a target block, setting goals and objectives; theoretical and methodological block, defining the main components, approaches and principles; organizational and technological block, reflecting the means, conditions, forms, ways of accomplishing the tasks, and diagnostic-criteria block, specifying criteria, indicators and results.

Table 01. Structural and informative model of formation of informational culture of cadets

	Social order of society and the state for the training of military engineers having informational culture		**Requirements of Federal State Educational Standard of Higher Education of training directions 090000, 110000 and professional standards of group 06**
Aim block	**Aim**	The formation of informational culture of future military engineer	
	Tasks	The formation of cognitive competencies, the formation of communicative competences, the formation of information and technological competences, the formation of informational and legal culture and ethics of informational interaction	

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<table>
<tr><td rowspan="4">Theoretical and methodological unit</td><td>Methodological basis</td><td colspan="3">Interdisciplinary, informational, activity-based, competence-based, technological, student-centered and synergistic approaches</td></tr>
<tr><td colspan="4">The components of information culture of cadets of military engineering specialties</td></tr>
<tr><td>Cognitive: knowledge and ideas about the informational picture of the world</td><td>Communicative: principles and rules of individual behavior in the informational society</td><td>Operational and substantive: practical skills connected with the receipt, storage, processing and transmission of information</td><td>Value-reflective: attitudes, assessments and relationship towards the information society</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="7">Organizational and technological unit</td><td colspan="4">Types of information activities of cadets</td></tr>
<tr><td colspan="2">Educational</td><td>Educational and professional</td><td>Military and scientific work</td></tr>
<tr><td>Forms</td><td>Lectures and seminars</td><td>Practical training</td><td>Independent study</td></tr>
<tr><td>Methods</td><td>Technologies of development of critical thinking</td><td>Informational and communication technologies, project method</td><td>Technologies of effective bibliographic search, search and behavior on the Internet</td></tr>
<tr><td>Didactic support</td><td colspan="3">Electronic interdisciplinary complexes on sets of systemically related disciplines aimed at the formation of cognitive, communication, informational and technological competencies</td></tr>
<tr><td colspan="4">Pedagogical conditions</td></tr>
<tr><td colspan="4">Improving the organization of the educational process on the basis of increasing motivation for informational activities, integration of the content, forms and methods of teaching of humanitarian, socio-economic, natural sciences and general professional disciplines and the use of electronic interdisciplinary complexes</td></tr>
<tr><td rowspan="7">Diagnostic and criterial block</td><td colspan="4">Criteria for the formation of cadet’s informational culture</td></tr>
<tr><td>The degree of formation of motivation for informational activities</td><td>The degree of formation of cognitive and communicative competences</td><td>The degree of formation of informational and technological competencies</td><td>The degree of formation of value installations</td></tr>
<tr><td colspan="4">Indicators of the formation of cadet’s informational culture</td></tr>
<tr><td>Motivation</td><td>Knowledge</td><td>Knowledge and skills</td><td>Competencies</td></tr>
<tr><td colspan="4">Levels of the formation of cadet’s informational culture</td></tr>
<tr><td>Low</td><td>Middle</td><td colspan="2">High</td></tr>
<tr><td>Result:</td><td colspan="3">A graduate of the military engineering specialty with informational culture</td></tr>
</table>

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The target block determines by the requirements of the third generation of Federal educational standards and the social order and determines the formation of information culture as the highest form of information technology competence as the main purpose of information training for cadets.

The theoretical and methodological unit describes the components of the information culture: cognitive (knowledge and understanding of the information picture of the world), communicative (principles and rules of individual behavior in the information society), operational and substantive (practical skills associated with receiving, storing, processing and transmitting information), value-reflexive (attitudes, assessments and attitudes towards the information society). The organizational and technological unit determines the types of informational activities, forms, methods and means of forming the components of the informational culture of cadets. There revealed the pedagogical conditions of the formation of the information culture of engineering cadets in the educational process of a military higher school (Kozlov & Undozerova, 2018).

The didactic support of the formation of the informational culture of engineering cadets based on the implementation of universal, general professional and professional competencies. It is also based on adjusting the structure and content of humanitarian, socio-economic, natural science, general professional and professional disciplines, taking into account the features of information activities of future military engineers and is due to the content of information processes and the structure of information activities and the future military engineer.

The cognitive, communicative, operational-content and value-reflexive components of the information culture of future military engineers can be formed in the process of purposeful training of cadets for information activities based on an interdisciplinary approach, where interdisciplinary is understood as the interaction of two or more scientific disciplines, each of which has its subject, its terminology and research methods (Lysak, 2016).

Educational and methodological support for the formation of information culture of cadets includes the forms of organization established by the regulatory documents of the Ministry of Defense of the Russian Federation (lectures, seminars, practical classes, laboratory work, etc.) and the methods of conducting classes in disciplines aimed at developing information and communication and information technology competencies like technologies for the development of critical thinking, methods of leveling education, the phased formation of mental actions, the project method, classification methods, structuring information and many others.

In the context of competence approach adopted by the Federal Educational Standard of 3rd generation, the most relevant are electronic interdisciplinary educational and methodical complexes containing theoretical material with the possibility of going through hyperlinks to previously studied topics, including related subjects; demonstration programs and computer simulators for the formation of skills and the restoration of lost skills; computer testing tools that include questions and tasks not only on current material, but also on previously studied disciplines; tools for automated assessment of the level of development of competencies based on the developed criteria and the fund of assessment tools, preservation of the history of periodic checks on the level of formation of competencies of each student and the development of individual corrective actions. Using electronic interdisciplinary educational-methodical complexes in the educational process of higher military educational institutions contributes to

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the formation of internal motivation of students to learn, to enhance interest and cognitive activity, to the development of general professional and professional competencies, to further improvement of the training of graduates of military educational organizations for the successful implementation of professional tasks in order to ensure readiness and defense capability of the country.

Software and technological support for the process of forming an informational culture of cadets includes software tools for supporting informational activities of military personnel, such as operating systems, software development tools, database management systems, office application packages, tools of technologies of virtualization and modeling, tools of development of electronic publications, management systems class and many others.

A part of software (operating systems, database management systems) must be certified by the Ministry of Defence of the Russian Federation in order to comply with the requirements of protecting information, which constitutes State secrets and in order to ensure the security of personal data and official information. The development of such software carried out by corporations "RusBITech", "Servionika", "Echelon", and others. Some educational software can be used autonomously for educational purposes. Possession of software and informational technologies is a essential for an information culture and the basic competence of a modern military engineer and obligatory for the success of completing of military professional tasks both in peacetime and during armed conflicts.

7. Conclusion

The obtained intermediate results on the experimental assessment of the level of information culture of cadets allow to conclude about highly probable confirmation of hypothesis that the implementation of universal, general professional and professional competences in the process of targeted information training of engineering cadets based on the integration of humanitarian, socio-economical, natural science, and general knowledge and professional disciplines will provide the formation of cognitive, communicative, operational-content and value-reflexive components of the information culture of future military engineers, which is an essential condition for successful adaptation in the modern information society and a guarantee of the effective professional activity of the future military specialist.

References

Ardashkin, I.B. (2017). Smart-obshchestvo kak etap razvitiya novykh tekhnologiy dlya obshchestva ili kak novyy etap sotcial'nogo razvitiya (progressa): k postanovke problemy [Smart society as a stage of development of new technologies for society or as a new stage of social development (progress): to the formulation of the problem]. *Tomsk State University Bulletin*, *38*, p32-45. [in Rus.].

FY 2017 Program Acquisition Cost by Weapon System (2016). Retrieved from: https://comptroller.defense.gov/Portals/45/documents/defbudget/FY2017/ FY2017_Weapons.pdf.

Gendina, N.I., Kolkova N.I., & Starodubova G.A. (2006) *Formirovanie informatsionnoy kul'tury lichnosti: teoreticheskoe obosnovanie i modelirovaniye soderzhaniya uchebnoy distsipliny* [Forming an Information Culture of a Person: Theoretical Substantiation and Modeling of the Content of an Academic Discipline]. Interregional Center for Library Cooperation. [in Rus.].

Guidelines On Information Literacy For Lifelong Learning (2006). *Final draft By Jesús Lau Chair, Information Literacy Section*. IFLA Boca del Río, Veracruz, México.

Haupt, M. (2017). *What is a Smart Society? Toward the transcendent model society of 2030*. Retrieved from: https://medium.com/project-2030/what-is-a-smart-society-92e4a256e852.

Information Security Threats (2019). Retrieved from: https://searchinform.com/ infosec-blog /fundamentals-of-is / information-security-threats/.

Kozlov, O.A., & Undozerova, A.N. (2018). Pedagogicheskiye usloviya formirovaniya informatsionnoy kul'tury kursantov inzhenernykh spetsial'nostey [Pedagogical conditions of formation of information culture of engineering cadets]. *Man and Education*, *3*(56), 123 - 131. [in Rus.].

Kozlov, O.A, & Undozerova, A.N. (2017). Informatsionnaya kul'tura lichnosti v kontekste sovremennogo informatsionnogo obshestva [Personal Information Culture in the Context of the Development of the Modern Information Society]. *Man and Education*, *4*(53), 46 - 52. [in Rus.].

Laminina, O.G. (2018). Informatsionnyye voyny: mif ili real'nost' [Information wars: myth or reality?]. *Humanitarian Gazette TSPU*, *1*(25), 17 – 23 [in Rus.].

Lysak, I.V. (2016). Mezhdistsiplinarnost': preimushestva i problemy primeneniya [Interdisciplinarity: advantages and problems of application]. *Modern problems of science and education*, *5*. Retrieved from: http://www.science-education.ru/ru/article/view?id=25376. [in Rus.].

Mittermeier, R.T. (Ed.) (2005). From Computer Literacy to Information Fundamentals. In *International Conference on Informatics in Secondary Schools. Evolution and Perspectives, ISSEP*. Springer.

Pirogov, A. I., & Zavalnev, V. I. (2014). Informatsionnaya kul'tura kak resurs obespecheniya bezopasnosti lichnostiv informatsionnom obshestve [Information Culture as a Resource for Ensuring the Security of the Person in the Information Society]. *Economic and Social-Humanitarian Studies*, *2*(2), 123-128. [in Rus.].

Tredinnick, L. (2008). *Digital Information Culture: The Digital Age Culture*. Elsevier Science.

Ugrozy v 2019 godu [Threats in 2019] (2019). *Kaspersky Security Bulletin*. Retrieved from: https://securelist.ru/kaspersky-security-bulletin-threat-predictions-for-2019/92782/ [in Rus.].

Virkus, S. (2012). *Information Culture. Learning Object*. Tallinn University. Retrieved from: https://www.tlu.ee/~sirvir/ Information% 20 and%20Knowledge%20Management/Information%20Culture%202/index.html.

Zheng, Y. (2005). Information Culture and Development: Chinese experience of e-health. In *Proceedings of the 38th Hawaii International Conference on System Sciences* (pp. 1-11).