РОЗДІЛ 2. ПРОФЕСІЙНА ОСВІТА
CHAPETR 2. VOCATIONAL EDUCATION

DOI : https://doi.org/10.51706/2707-3076-2024-11-3
UDC 378:359-051]:005.336.2-028.63

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ANALYSIS OF THE PROBLEM OF TRAINING FUTURE NAVAL OFFICERS THROUGH THE PRISM OF THE DEVELOPMENT OF THEIR INFORMATION AND DIGITAL COMPETENCE

The article is devoted to substantiating the relevance of the development of information and digital competence (IDC) of future naval officers in the conditions of their professional training. The challenges Ukrainian military educational institutions face, including resource constraints and the need to modernize training methods, prompt a more thorough study of the existing training experience in the context of digitalization of the society. At the same time, a cursory analysis of scientific papers indicates the need for more systematic research on the formation of information and digital competence of naval officers. The study aims to analyze the problem of training future naval officers through the prism of developing their information and digital competence. Based on the results of the analysis, we identified the following critical gaps in solving the problem of formation/development of the IDC of future naval officers: lack of comprehensive comparative studies that would systematically analyze the state and trends in the development of digital competencies of seafarers in Ukraine and abroad; insufficiency of scientific papers that consider effective methods, technologies and approaches to the formation of information and digital competence in the process of professional training of future naval officers; lack of in-depth analysis of the compliance of domestic standards and curricula for maritime specialties with modern educational requirements of labor; the need for empirical research that would study in more detail the opinions and positions of key stakeholders (teachers, cadets, employers) on current problems and prospects for the development of competencies of future naval officers. The research proves the relevance of the formation of different competencies of specialists, including information and digital ones, as well as the need to deepen and expand scientific research on developing the IDC of future naval officers.

Keywords: *information and digital competence, problem of competence development, naval officers, professional training.*

Statement of the problem. The issue of military training in Ukraine in general has been of great interest in recent years, in particular in the context of the country's efforts to strengthen its defense capabilities and adapt to new security challenges. Among the main prerequisites for the effective formation of the future digital professional education of the military is the use of innovative technologies for the organization of professional training activities that model interdisciplinary professional cases, as well as professional and general areas of professional education of military personnel in general and naval officers in particular. Here we mean the need to form the readiness of future specialists in higher maritime educational institutions, which includes the use of computer technologies in practical training and the development of professional and personal qualities, which together characterize a specialist's information and digital competence (SIDC). However, the peculiarities of its formation are not established, and therefore it seems expedient to conduct a retrospective analysis of the problem of training future naval officers through the prism of developing their information and digital competence.

Analysis of current research. The scholarly

literature emphasizes the importance of understanding the historical context of military education in Ukraine, particularly the reforms and changes since 2014. Several studies, including (Prykhodko, 2023), highlight the significant changes that have taken place in the training practices of the Ukrainian military in response to geopolitical tensions and security threats facing Ukraine. Another publication (Polishchuk, 2023) provides an in-depth look at the historical context, noting that a renewed focus on military preparedness and integrating modern military training methodologies has marked the period since 2014. The author emphasizes the need for continuous professional development and adaptation to the changing nature of war, as the Ukrainian military has to contend with constant conflicts and the emergence of new security challenges.

Authors of one more paper (Voloshin et al., 2022) explore changes in military training strategies in Ukraine from 2013 to 2020, emphasizing the evolution of training methods and an increased emphasis on military self-development. The study suggests that the challenges faced by the Ukrainian military, including resource constraints and the need to modernize training methods, have prompted a more thorough examination of the effectiveness of existing training programs and the importance of individual self-training.

At the same time, the analysis of these scientific works does not pay attention to the information and digital competence of military and naval officers.

The study aims to analyze the problem of training future naval officers through the prism of developing their information and digital competence.

Research methods. We used theoretical methods of scientific knowledge: analysis and generalization of scientific results related to military and future naval officers' training. We identified those associated with introducing IT in their training and acquiring professional knowledge and skills to use IT in their professional activities. We analyzed scientific publications on various aspects of military training in Ukraine, including the historical context, methodological approaches, integration of modern technologies, psychological factors and challenges military personnel face in their professional activities.

Discussion and Analysis. The analysis of scientific literature demonstrates the significant impact of digital technologies on the transformation of training methods for future naval officers in Ukraine and abroad. Researchers (Sharma et al., 2023) note an increase in using simulators, mobile applications, and virtual platforms in the educational process. The authors emphasize that such technological solutions contribute to developing future officers' linguistic, communicative, and other essential competencies. At the same time, scientists (Oruc et al., 2024) pay attention to the formation of new digital roles in the maritime industry, such as Data Scientist, Data Engineer, and Data Analyst, which provides an opportunity to improve relevant skills in the process of training and self-training. This indicates a general trend of increasing importance of digital competencies for the successful careers of naval officers.

The literature discusses the concept of self-training, which is seen as a critical component of military readiness. In the article authors (Voloshin et al., 2022) highlight the importance of individual initiative and continuous self-development among Ukrainian military personnel: statistics showing a 30% improvement in skills through self-training initiatives, highlighting the tangible benefits of this approach.

As Ukraine continues to confront growing security threats, the importance of effective military training and self-training will become even more prominent. The literature analysis shows significant changes in the educational process organization and approaches to self-training future naval officers in Ukraine from 2013 to 2020. In the article (Zaitsev, 2023) the author notes the increased attention to the issues of independent learning, flexibility in the organization of the educational process and the introduction of new digital tools. Another article (Kiriakidi, 2024) emphasizes that the COVID-19 pandemic has significantly impacted self-training methods, leading to the transition to an online learning format. In this context, a SWOT analysis of the effectiveness of new methodological approaches was carried out, and the popularity of outdoor training as a way to improve officers' practical skills has increased. The researchers emphasize the importance of integrating digital technologies into the educational process of self-study, which has become one of the key organizational features in recent years. In addition, they draw attention to the need to adapt

curricula to modern realities, also through the introduction of combined teaching methods. Similar trends can be traced in foreign practice. Thus, researchers (Kusmiyati & Hamidah, 2023) indicate the growing importance of quality assurance standards in higher education in the European Higher Education Area, which affects the organization of self-training of naval officers. The authors also emphasize the need for adaptability of training methods to the requirements of digital competencies which are becoming more in demand in the maritime industry.

The analysis of scientific literature allows us to identify several aspects of the foreign practice of training naval officers, which can be useful for the domestic military education system. One analyzed publication (Zlobina, 2023) emphasizes the importance of integrating the quality assurance standards of higher education of the European Higher Education Area in military training curricula. The author also emphasizes the need to adapt teaching methods to modern requirements, particularly regarding forming digital competencies. In another publication its author (Oruc, 2024) substantiates the importance of cybersecurity skills and their formation, focusing on the continuous improvement of educational approaches and considering international experience as a guiding light. The researchers provide examples of successful self-training programs implemented in different countries that can be adapted to the Ukrainian military education system, enriching it with global insights.

Foreign scientific practices touch upon the use of IT in military training. A significant part of scientific research touches on issues of cultural interaction. In particular, we note J. Horck's scientific research on training maritime transport specialists for cultural interaction between interlocutors in a multinational ship's crew (Horck, 2004).

Another aspect of digitalization in foreign practices concerns the unification of military training. In particular, scientists (Baltadzhi, 2022) raised the issue of standardizing the training of naval officers. The authors argued that the shipping industry is one of the most globalized industries and is characterized by complex modular supply chains, mainly outsourcing labor from developing countries and Eastern European states with economies in transition. Despite the long-term efforts of international organizations to standardize and regulate seafarers' vocational education (vocational training), differences in practice and standards persist. Employers exert an ambiguous (often contradictory) influence on educational institutions, on the one hand, demanding to provide more specialists urgently. On the other hand, they complain about the low quality of their training, therefore calling for a more meticulous procedure for monitoring knowledge and skills.

In one of the publications dealing with the issue of standardization of training of maritime specialists, (Bloor et al., 2014), the authors highlight the problem of variability of standards and practices in the training and certification of seafarers, particularly in the context of forming their digital skills. Researchers point to employers' written requirements for educational institutions, which creates a certain "double pressure" on the training system. They also argue that despite international organizations' long-term efforts to standardize seafarers' education, today we still observe significant differences in approaches to assessing learning outcomes, including digital competencies.

The next aspect of the impact of IT on the professional activities of naval officers is related to cyber threats and, accordingly, cybersecurity. Cybersecurity is a set of technologies, processes, and practices used to protect networks, devices, elections, applications and data from a variety of attacks and unauthorized access (De Groot, 2020). The authors emphasize that today, when there is an extremely rapid development of IT and information wars are being waged, more than ever before, the basic foundations of cybersecurity should be laid in professional training programs for specialists, especially in the military sphere. The authors conclude that it is important for officers to be proficient in computational techniques designed to combat cyberattacks, which are constantly improving in complexity and frequency level. In another paper (Naja et al., 2019) the researchers argue that people's lives are increasingly connected between the real and digital worlds, and therefore future officers as IT consumers need to gain knowledge in the field of security to protect the personal and professionally oriented information (Zhuravel, 2021). A recent report on cyberspace-related threats has seen an increase in remote login attempts and unsafe user behavior, creating opportunities for attackers to target weak

(unprotected) systems. It is noted that among the sectors under threat, the professional and information-personal sectors are the ones that receive the largest amount of malicious activity (Brown, 2018).

The authors of another research project (Naja et al., 2019) explore hands-on experience solving the problem through the training of naval reserve officers in cybersecurity in a 15-week program. As the authors note, the program involved the development of a digital tool that collected and analyzed publicly available social media data using algorithms and data mining techniques. To justify the expediency of their approach, the authors emphasized that today the learning outcome is generally a problem since students do not receive information as it is presented (Ben-Ari, 1998): students, having their own experience and individual characteristics, have their own version of educational information, and then they try to define the processes and characterize them as something familiar to them. Therefore, many students misunderstand what they have learned and face difficulties in studying. Another aspect emphasized by the authors is the ability to relate what has been learned to something familiar that is important for comprehension and memorization (Guzdial & Soloway, 2002).

Scientists emphasize that military education institutions have the tools necessary to train cyber-literate officers. Therefore, the US military academies have already begun implementing programs synthesized in cybersecurity and electronic warfare technologies. In particular, a team project was organized for midshipmen, which consisted of creating a digital tool for analyzing tweets (data mining), which would hypothetically provide the military team with enough up-to-date information to identify a user who could threaten national security. The software was based on the Python programming language and aimed to achieve four learning objectives: Create a basic user profile when given a Twitter username; Create a customized/filtered user profile with a Twitter username; Conduct a general analysis of the text that would provide a word cloud of the most frequently used words in the tweets of a particular profile using the user's Twitter nickname and find the five most commonly used words; Conduct a general sentiment analysis that would provide a percentage of positive, negative, and neutral tweets for a profile that has been given a Twitter username. The results showed the project's success, which will be further implemented in the training of midshipmen.

Separately, the works related to the study of the development of personal qualities were carried out in the conditions of professional training of naval officers. Among such scientific developments, we note the studies of E. Sinambela, R. Mardikaningsih, H. Ayu (Sinambela et al., 2020). These scientists substantiate uninterrupted digital self-development and the development of professional competence as the basis for successful professional training today. In a study by D.Reis, A.Fleury and M.Carvalho (2021), the conceptual vision of the problem under analysis has been expanded. The researchers are interested in developing an individualized model of the process of digitalization of vocational education, based on the principles of intercultural communication, information communication, and work communication. In this regard, many scientists today characterize the modern education system digitalized as the basis for the professional activity of future specialists. At the same time, the problem of functional characteristics of the structural elements of the process of digitalization of vocational education and the analysis of the features of this process in wartime and post-war times in the scientific works of modern scientists is largely ignored or insufficiently studied, which necessitates expanding the scope of existing research, in particular, on the impact of digitalization on the results of training of naval officers.

The development of IT in education is an area of research that has attracted considerable attention from scientists in recent years. Authors (Ölçer et al., 2023) emphasize the need to revise the educational program for future naval officers due to the rapid digitalization of the industry. The researchers emphasize that deepening the digital competencies of seafarers is becoming important for their competitiveness in the labor market. At the same time, the authors point to the lack of development of effective methods and approaches to the formation of such competencies in the process of professional training.

In the article the author (Prykhodko, 2023) emphasizes the need to introduce domestic standards in terms of the formation of digital competencies in future naval officers. At the same

time, the publication emphasizes that research on this issue in Ukraine is fragmentary, and the issues of developing effective methods and technologies for the formation of digital competence remain poorly researched.

The analysis of the works of scientists also gave grounds to identify studies that highlight:

– aspects of the use of DT for simulation in professional situations and vocational training, including mobile applications, and game applications for training military specialists (Asri et al., 2019), interactive digital platforms for cybersecurity training (Lee et al., 2022), specialized software (for example, MilChat) for the training of military officers (Maistrenko, 2021) and electronic simulators for training maritime officers-border guards ("Navigation simulator", "AK-230 artillery simulator", "Navigation and boat management", "Artillery and machine gun armament of ships (boats) of the Marine Guard") (Perehniak, 2021);

– aspects of using mobile applications that are focused on maintaining/ improving mental health (e.g., The Road to Mental Readiness (R2MR) app, Unit Victor, UrMMIND, iFeel in studying (Vermetten et al., 2020);

– development and use of electronic educational resources for the organization of military training and its support (Didenko et al., 2020);

– aspects of cognitive skills development, including developing military information processing skills (Yang et al., 2022).

Systematization of the research results revealed that in some publications (Ilchenko, 2023), the state of formation of the IC of future border guard officers in Ukraine is analyzed. The author found that the military education system of Ukraine pays attention to developing this competence, but its level remains insufficient. The author attributes this to such problems as the lack of a clear conceptual framework for developing information and digital competence, the need to improve the motivational component, and insufficient methodological elaboration of the use of digital technologies in the educational process.

One of the key aspects that emerges from the analysis of the scientific publications is the importance of building digital competence for future naval officers in the modern, technology-oriented seascape. As noted in the paper (Tovstokoryi & Popova, 2021), the integration of digital technologies and intellect into the educational process of naval officers is an urgent priority. Therefore, it is important to consider the specific skills, knowledge, and attitudes that constitute information and digital competence in the context of their professional training. A similar conclusion was reached by the authors (Sharma et al., 2023) who conducted research on the use of AI as a conversational agent (or chatbot) at the Norwegian Maritime University. The researchers describe the process of developing and implementing "FLOKI," a chatbot aimed at helping maritime trainees learn the Collision Avoidance Regulations (COLREG). The students, future naval officers, interacted with the chatbot to reflect on their knowledge of COLREG.

Another area of research that stems from the analysis and systematization of scientific papers is the role of independent learning in the development of personal qualities. Several publications, including (Islamova, 2022), emphasize the importance of using online platforms, digital tools, and collaboration technologies to improve the digital skills of future naval officers. The author argues that a pertinent research issue in this area is the development of self-study strategies and the integration of digital technologies for the effective development of the CCI of future naval officers. It is emphasized that it is important to explore specific self-study approaches, digital resources, and teaching methodologies that can facilitate the acquisition of information and digital skills in the context of self-directed learning.

Scientific publications also highlight the challenges and barriers that future naval officers may face in the process of developing their own competence. Thus, (Marchenkov, 2019) analyzes the difficulties that arise in the formation of information and analytical competence. An open question, which the author highlights, is the identification of key barriers and obstacles that hinder the development of competence of future officers, and how these challenges can be effectively overcome. It is important to develop strategies to overcome these obstacles and improve the effectiveness of training. The problem of the role of educational frameworks and methods for assessing the degree of development of digital competence is raised.

Some publications highlight the importance of aligning the development of digital competence with the specific requirements and standards of the

maritime industry. In the recent article the author (Zlobina, 2023) discusses the integration of NATO standards and their adaptation to modern technological requirements in the training of future naval officers. Therefore, it becomes important to investigate how the development of information and digital competence of future naval officers is consistent with the specific needs and standards of the maritime industry, including the integration of international frameworks and recommendations. The authors see prospects in the study of the strategy for ensuring compliance and effectiveness of educational programs in preparing future officers for the technological requirements of the maritime industry.

Conclusions. The carried out analysis of scientific research allowed us to identify the following key gaps in solving the problem of formation/development of the IDC of future naval officers: lack of comprehensive comparative studies that would systematically analyze the state and trends in the development of digital competencies of seafarers in Ukraine and abroad; insufficiency of scientific papers that consider effective methods, technologies, and approaches to the formation of information and digital competence in the process of professional training of future naval officers; lack of in-depth analysis of the compliance of domestic standards and curricula for maritime specialties with modern educational requirements of labor; the need for empirical research that would study in more detail the opinions and positions of key stakeholders (teachers, cadets, employers) on current problems and prospects for the development of competencies of future naval officers.

Thus, despite the existing scientific researches that consider the problems of forming different competences of specialists, including information and digital ones, their fragmentation necessitates the need to deepen and expand scientific research on the development of the CCI of future naval officers.

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АНАЛІЗ ПРОБЛЕМИ ПІДГОТОВКИ МАЙБУТНІХ МОРСЬКИХ ОФІЦЕРІВ КРІЗЬ ПРИЗМУ РОЗВИТКУ ЇХ ІНФОРМАЦІЙНО-ЦИФРОВОЇ КОМПЕТЕНТНОСТІ

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Стаття присвячена обґрунтуванню актуальності розвитку інформаційно-цифрової компетентності майбутніх морських офіцерів в умовах їх професійної підготовки. Виклики, з якими стикаються українські військові заклади освіти, зокрема обмеження ресурсів і необхідність модернізації методів навчання, спонукають до більш ретельного вивчення наявного досвіду підготовки в умовах цифровізації суспільства. При цьому побіжний аналіз наукових праць свідчить про відсутність системних досліджень щодо формування інформаційно-цифрової компетентності морських офіцерів. Метою дослідження є аналіз проблеми підготовки майбутніх морських офіцерів крізь призму розвитку їх інформаційно-цифрової компетентності. За результатами проведеного аналізу було виявлено такі важливі прогалини у розв'язанні проблеми формування та/або розвитку ІЦК майбутніх морських офіцерів: відсутність комплексних порівняльних досліджень, які б системно аналізували сучасний стан та тенденції розвитку інформаційно-цифрової компетентності (ІЦК) морських офіцерів в Україні та за її межами; відсутність наукових досліджень, які б вивчали ефективні методи, технології та підходи до формування ІЦК в процесі фахової підготовки майбутніх морських офіцерів; вимоги до ІЦК, національний рівень та особливості формування ІЦК фахівців. Проведене дослідження засвідчує актуальність питань формування різного роду компетентностей, зокрема ІЦК військових, а також необхідність поглиблення та розширення наукових досліджень у сфері формування та розвитку ІЦК майбутніх морських офіцерів.

Ключові слова: *інформаційно-цифрова компетентність, проблема розвитку компетентності, морські офіцери, професійна підготовка.*

Стаття надійшла до редакції / Received 01.08.2024
Прийнята до друку / Accepted 25.10.2024
Унікальність тексту 96,20 % («StrikePlagiarism» *ID 329754382)*