

4.1. The Evolving Role of the Foreign Language Teacher in Integrating the STEAM Approach Into Military Education

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Abstract. *The section explores the evolving role of the foreign language teacher in integrating the STEAM approach into the training of military specialists. It argues that language instruction in military education should move beyond isolated linguistic practice toward interdisciplinary learning that connects linguistic, technical, and professional competencies. The study identifies the core professional functions of the language teacher (educational, constructive, research, organizational, and evaluative) and explains how they transform in a STEAM-based environment. Particular attention is paid to the integration of language and professional disciplines, which fosters communicative, analytical, and decision-making skills essential for modern officers. Drawing on Canadian experience, the paper illustrates how project-oriented and technology-enhanced learning models can strengthen teamwork, intercultural competence, and professional adaptability. The survey conducted among cadets of the Hetman Petro Sahaidachnyi National Army Academy confirms the relevance of the STEAM approach and highlights the teacher's role as an interdisciplinary facilitator who bridges linguistic and technical domains. The findings can inform the design of in-service training programs for foreign language teachers and contribute to the modernization of Ukraine's military education system.*

Keywords: *STEAM education, military education, interdisciplinary learning, foreign language teacher, Canada-Ukraine cooperation.*

Introduction

Currently, the military education system is undergoing significant transformations in response to the challenges of a full-

scale war, the dynamic development of technologies, and globalization processes. In such circumstances, there is a growing need to train specialists capable of interdisciplinary thinking, teamwork, and effective communication in situations of stress and uncertainty. One of the promising areas for modernizing the educational process is the introduction of the STEAM approach (science, technology, engineering, art, and mathematics), which ensures the integration of different fields of knowledge and promotes critical and creative thinking. In this context, the role of the foreign language teacher is of particular importance, as they not only provide language training but also act as mediators of interdisciplinary dialogue, developing the communicative competence of military personnel in professional situations. Studying the experience of Canada as a country with a developed system of military training based on STEAM education is relevant for updating the Ukrainian model of language teaching in higher military educational institutions.

In recent years, the problems of STEM education research have become increasingly relevant, and modern Ukrainian and foreign researchers are engaged in their development. Thus, the problem of implementing the STEM approach in educational institutions of various levels and profiles is reflected in the works of scholars such as O. Hrybiuk, L. Hryzun, N. Morse, V. Sipi, O. Stryzhak, and I. Chernetskyi, among others. The studies of foreign scientists are of great interest, as noted by J. Confrey, M. Harrison, A. House, D. Langdon, B. Means, N. Morel, and E. Peters-Burton, among others. However, the issue of using the STEAM approach in military education remains poorly understood and therefore requires generalization and detailed study.

The purpose of this paper is to analyze the possibilities and benefits of implementing the STEAM approach in the training of military specialists, to outline the role of the foreign language teacher in an interdisciplinary learning environment, and to explore the practical aspects of adapting Canadian experience to Ukrainian realities.

The study employed a set of general scientific and specialized methods, which enabled a comprehensive characterization of the specifics of implementing the STEM approach in military education in Ukraine and its importance for

the formation of highly qualified military personnel. The methodological approach was based on a systematic analysis, which allowed us to consider STEM education as an integrated system with an interdisciplinary structure that includes natural, technical, engineering, and mathematical components. The application of the structural-functional approach enabled the identification of key functions of the STEAM approach in enhancing the human capital development of the Armed Forces of Ukraine, increasing competitiveness, and strengthening the state's innovative potential. In addition, a comparative analysis of modern scientific publications by Ukrainian scientists was conducted, which enabled us to summarize theoretical approaches to defining the essence of the STEAM approach and its key advantages, as well as to analyze the challenges associated with its implementation in practice.

Research Results

Implementation of STEAM education is becoming increasingly relevant in the modern world, as this learning model not only promotes critical thinking and creativity but also prepares students for the challenges of the future. STEM education, which integrates science, technology, engineering, mathematics, and the arts, is a key component of the modern educational process. The introduction of STEAM education is strategically important for the future development of society, particularly in the context of the Fourth Industrial Revolution and globalization. STEAM education is a comprehensive educational approach that integrates science, technology, engineering, arts, and mathematics to develop students' comprehensive, analytical, creative, and practical skills. This methodology is designed to prepare students to solve real-world problems through interdisciplinary learning that fosters innovation, critical thinking, and teamwork (Bocharova, 2024, p. 389). STEAM education focuses on the development of creativity and an innovative approach, combining technical and humanitarian knowledge to achieve comprehensive student development.

As N. Matsai notes, the STEAM approach makes it possible to develop critical, practically oriented thinking in students,

flexibility in perceiving and understanding new information, a different view of the problem, the ability to defend their opinions; it will allow them to develop the ability to research, analyse, experiment and teach them to successfully combine the acquired knowledge to solve practical problems and further use it in their professional activities (Matsai & Gubska, 2023, p. 45).

Furthermore, the STEM approach is based on several key principles. The principles of STEM education form a system of provisions that serve as the basis for organizing the cognitive activity of participants in the educational process using the STEM approach (Fig. 1).

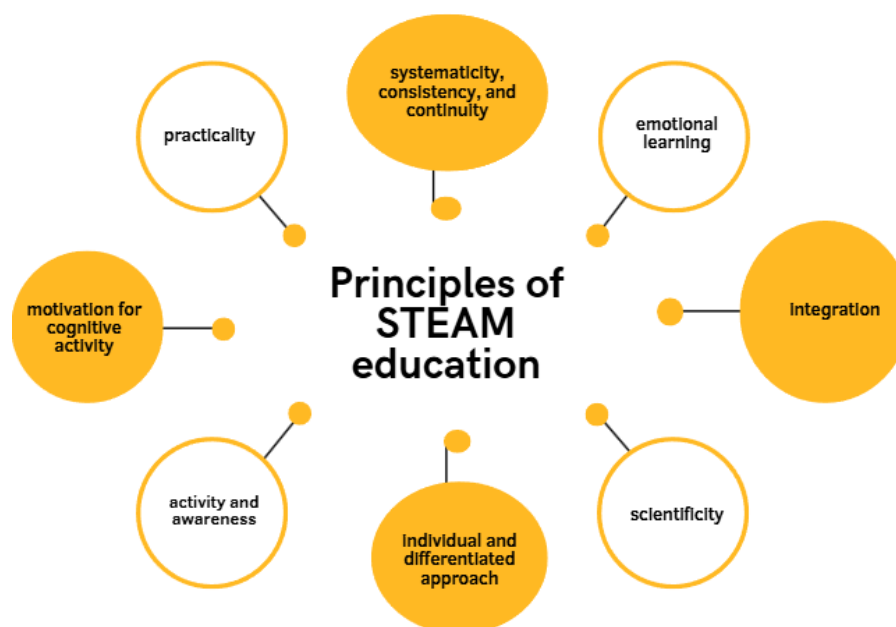


Figure 1. Principles of STEM education

The principle of integration. The essence of integration is to combine individual elements, characteristics, and functions into a single holistic system, which, as a result, acquires new integrative properties. In the context of STEM education, integration covers not only the combination of knowledge from different fields - physics, mathematics, geography, biology, ecology, and art - but also the introduction of a whole range of forms and methods of teaching that contribute to the effective acquisition of this knowledge and the development of interdisciplinary thinking.

The principle of science involves establishing cause-and-effect relationships based on reliable, proven knowledge that corresponds to the current level of science and technology. In STEM education, it is essential that students form such connections independently, integrating knowledge from various fields and utilizing modern, innovative methods of acquisition.

The principle of practicality (linking learning to real life) focuses the educational process on the use of examples from everyday life that contribute to the understanding of natural laws and phenomena through direct practice. The STEAM approach is based on practice-oriented forms and methods that enable you to learn about the world around you through active work.

The principle of consistency, systematicity, and continuity is based on a holistic perception of phenomena and processes, taking into account the interconnections between all elements of the system. STEM education implements this principle through a continuous and consistent learning process that begins in childhood and continues throughout life. This provides a multi-level understanding of objects and phenomena in their dynamics, interaction, and development.

The principle of activity and awareness encourages students to learn independently and solve problem situations. In STEM education, this principle is implemented by engaging participants in conscious activity, which results in the formation of a reasoned and effective approach to solving problems.

The principle of motivation for cognitive activity involves maintaining an internal desire to learn, which can be supported by external factors. In the STEM approach, motivation is enhanced by raising topical issues that can improve the quality of life. This encourages the integration of knowledge from different fields and its practical application.

The principle of an individual and differentiated approach emphasizes independence, taking into account the individual characteristics and pace of development of each participant. In the context of STEM education, this is realized through independent research, choosing a personal learning trajectory, encouraging teamwork while maintaining personal activity and involvement in educational interactions.

The principle of emotional learning emphasizes the role of emotions in the cognitive process. The STEM approach is based on the practical solution of real-world problems that are of personal importance to participants. Emotional involvement in the process contributes to deeper learning, increased motivation, and the formation of a positive attitude towards learning (Postova, 2024, p. 140-141).

Importantly, the STEAM approach in the educational process is increasingly being implemented not only in civilian but also in military education. In the context of training military specialists, it enables the development of professional competencies, critical thinking, creativity, teamwork, and interdisciplinary interaction – qualities that are crucial in the modern combat environment. Currently, in the context of a full-scale war, STEM education should become the primary focus in updating innovative technologies within educational institutions, including those in the military, because modern technologies and military education are the primary factors capable of deterring the enemy.

The main advantages of using the STEAM approach in the training of military specialists are as follows:

1. Development of interdisciplinary thinking – STEAM integrates knowledge of science, technology, engineering, art, and mathematics, which enables military professionals to think systematically, consider tasks from different perspectives, and make informed decisions in the face of uncertainty.
2. Increasing the level of adaptability and creativity – by incorporating the artistic component of the STEAM approach, cadets develop creative thinking and the ability to solve tactical and strategic tasks in a non-standard way.
3. Preparation for a real interdisciplinary environment – the modern military environment requires knowledge not only of combat, but also of IT, cybersecurity, logistics, engineering, and psychology. STEAM provides an integrated approach to training such specialists.
4. Increasing the effectiveness of teamwork – STEAM education is focused on collaborative forms of learning, including group work, problem solving, and joint planning of operations, which is extremely important in the military profession.

5. The use of practice-oriented methods – project-based learning, simulations, and case studies helps develop decision-making skills in stressful situations, analytical thinking, and rapid response.

6. Development of digital literacy – through the use of technological tools (drones, geographic information systems, etc.), the STEAM approach develops digital competencies required in the modern man-made military environment.

7. Motivation to learn – STEAM increases the interest of cadets through relevant, integrated, and applied learning content that is directly related to their future professional activities.

8. Flexibility and innovation – this approach contributes to the formation of a new type of leader, open to innovation, ready for rapid change, and able to act effectively in the face of hybrid threats.

Today, national programs in STEM education are being actively implemented in countries around the world, including Australia, China, Great Britain, Israel, South Korea, Singapore, and the United States. They are based on a combination of interdisciplinary and project-based approaches, as evidenced by the widespread introduction of STEM subjects in the curricula of leading US universities. In the field of military management, the requirement for military professionals to be not only disciplined and responsible but also able to make effective management decisions, implement innovative approaches, and act effectively in conditions of high uncertainty is becoming increasingly important. This requires possession of modern digital competencies, basic technical knowledge, and skills in working with information technology. The application of an interdisciplinary approach, the creation of a digital educational environment and the possibility of developing their own STEM projects during professional training and advanced training, as well as the integration of educational robotics elements into the curricula of military universities, all contribute to: increasing the interest of military personnel in technical sciences and engineering; better mastery of technology-related disciplines; development of critical, innovative and creative thinking; formation of skills in solving practical problems and mastering the use of modern information technologies. As a result, this approach enables training military specialists who cannot only adapt to changes but also actively participate in

creating technological solutions for performing service tasks (Prokopenko, 2022).

The current system of training military specialists in Canada implements a phased system that ensures continuous professional development throughout the entire service. A key feature of the training is the mandatory combination of higher education with military service, which enables more effective learning and the consolidation of new knowledge in practice. Officers of the Canadian Armed Forces, holding leadership positions, are responsible for the safety, welfare, and morale of their subordinates, as well as analytical work, planning, management, decision-making, and strategic recommendations. Canadian officer training is based on five areas: tactical training, education, leadership, self-development, and experience. These are the aspects that are emphasized in the career development of military personnel (Army in Canada, 2022).

This training format provides for a deeper understanding of the material and allows for immediate consolidation and application of the knowledge gained during service. During the course of service, the serviceman utilizes the relevant knowledge required to perform tasks in accordance with their new position. Given the hierarchical career development system in the Canadian military, it can be argued that a flexible, phased model of education is the most appropriate and effective approach. This relationship between education and career advancement has both advantages and limitations. On the one hand, the system stimulates continuous learning, development, and improvement of professional skills, while on the other hand, focusing on a specific future position narrows the serviceman's range of knowledge. At the same time, such specialized training allows one to achieve a high level of professionalism in the chosen field of activity (Voronin & Trishchun, 2022, p. 111).

In addition, Canada actively employs the STEAM approach in the training of officers and military specialists, as it enables the integration of technical, humanitarian, and managerial skills, which is particularly important within modern hybrid threats and the dynamic evolution of military technologies. Canada uses project-based learning, where cadets work on projects that integrate science, technology, engineering, arts, and

mathematics. This approach implies that cadets not only acquire theoretical knowledge but also work on practical interdisciplinary projects that simulate real military tasks and situations that may arise during their service. Throughout the project activities, participants learn to apply modern technologies, analyze information, develop innovative technical solutions, work in teams, and communicate effectively, including in foreign languages. All of this helps develop critical and systematic thinking, leadership skills, and the ability to take a holistic approach to problem-solving, which is especially important in the rapidly evolving military technologies and the need for international cooperation.

As for foreign language instruction in the Canadian Armed Forces, the Foreign Language School is responsible for providing foreign language training to support the needs of the Armed Forces. The training is provided in three different programs, which are designed to meet the specific needs of the tasks and goals. The first is the basic program for learning foreign languages, which the national military agency aims to implement to train linguists, military diplomats and translators, as well as officers for international commissions, officers in charge of training internships (and a number of other specialists) with the knowledge of foreign languages to the extent that they can effectively solve their tasks. Today, there are five main courses that teach more than 30 foreign languages (Vorona et al., 2022, p. 45).

Another important area is the Combat Training Support Program, the main purpose of which is to teach officers from participating countries in the Partnership for Peace program English and French. This helps to achieve interoperability between armed forces during NATO operations, and also allows foreign military personnel to learn about the government, social features, culture, and organization of the Canadian Armed Forces. The courses are conducted for different categories of military personnel, varying in duration (10-17 weeks), international representation (from 4 to more than 13 countries), and participant numbers (from 40 to 200 people).

The third area is the second foreign language program. Its main goal is to provide the Canadian Armed Forces with a sufficient number of bilingual personnel (primarily English and

French), which is especially important in the context of the numerical reduction of the armed forces and the complexity of combat training and troop organization. As a rule, second language teaching is organized in linguistic centers subordinated to the command of a particular type of armed forces (Dyson, 2022).

A crucial role in this process is played by the foreign language teacher, whose contribution to interdisciplinary teaching is pivotal. In the context of globalization and active international cooperation (in particular, within the framework of Canada-Ukraine military partnership programs), a high level of communicative competence is becoming a prerequisite for effective interaction with foreign colleagues, participation in international exercises, joint operations, and access to modern military technologies and knowledge. A foreign language teacher in the STEAM approach is not limited to traditional grammar and vocabulary teaching; instead, it integrates language training with technical, engineering, scientific, and management disciplines. This is achieved through the use of project-oriented tasks, modelling real military situations, and the use of digital technologies and artificial intelligence tools to develop intercultural communication and critical thinking skills.

In our opinion, the foreign language teacher in the interdisciplinary training of military specialists plays a multifunctional role that extends beyond the traditional teaching of grammar and vocabulary. Firstly, it is worth noting that the teacher develops students' foreign language skills necessary for participation in international military operations, cooperation within NATO, and the exchange of experiences with foreign colleagues, including the development of oral and written communication skills, negotiation, report writing, and military documentation. In the STEAM approach, the foreign language teacher collaborates with instructors in military tactics, cybersecurity, engineering, and medicine to create learning situations where language is used in a practical context. These can include role-playing games, simulations of military operations, and team projects that combine linguistic and professional competencies.

In addition, given that the military is often involved in peacekeeping missions and international operations, a foreign language teacher helps to acquire knowledge of the cultural characteristics of partner countries, which contributes to effective communication, reducing conflict situations, and strengthening mutual understanding between allies. Interdisciplinary training involves analyzing real-life military scenarios, which encourages students not only to reproduce language structures but also to think strategically, justify decisions, argue a position in a foreign language, and more. In addition, in Canada and, gradually, in Ukraine, teachers are actively using artificial intelligence, online simulators, language simulators, and interactive platforms to develop teamwork skills and improve learning efficiency.

The teacher is not only a source of knowledge but also a facilitator who supports students, organizes the educational process, and motivates them to achieve their goals (Hutsul, 2024). The foreign language teacher also serves as a mentor, helping military personnel overcome the language barrier, lack of confidence in communication, and adapt to a multicultural environment, while enhancing their stress resistance in international military missions.

We believe that a foreign language teacher in interdisciplinary education performs a number of important functions, including:

- diagnostic
- prognostic;
- constructive and designing;
- informative and explanatory;
- organizational;
- analytical and evaluation;
- communicative and stimulating;
- research and creative (Fig. 2).

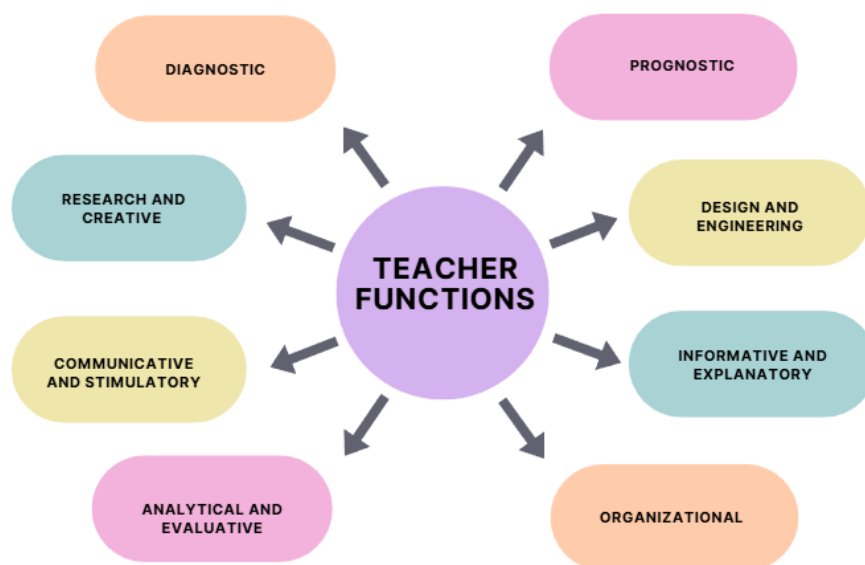


Figure 2. Functions of a foreign language teacher in interdisciplinary teaching

Thus, the diagnostic function involves recognizing and determining the knowledge, skills, and development skills of military specialists, their language competencies, strengths, and weaknesses, which makes it possible to qualitatively analyze the educational process, identify factors that contribute to the successful implementation of interdisciplinary learning, and determine the needs and directions of further work. The teacher should be observant in identifying individual abilities of military education students.

The prognostic function is associated with predicting the results of one's own activities focused on specific goals and objectives, predicting possible learning outcomes, developing strategies for speech skills, and integrating them with other disciplines. The prognostic function also implies a vision of the traits of military specialists that can be formed over a certain period of time.

The constructive and design function is closely related to the prognostic function and consists of the selection and organization of the content of educational work, in designing the activities of military specialists, taking into account their needs, as well as their own future activities, in the ability to reorient the goals and content of education to specific tasks of interdisciplinary learning.

This function is realized through the development of curricula, tasks, and methodological materials designed to achieve the goals of interdisciplinary education.

The informative and explanatory function is related not only to the ability to present educational information in an accessible way but also to the skills of research, professional activity, and effective interdisciplinary learning. A foreign language teacher acts as a carrier of scientific, ideological, moral, and ethical information, while also providing new knowledge, explanations of complex linguistic phenomena, and ways of applying them in a professional and interdisciplinary context.

The organizational function is determined by the ability to engage military professionals in various activities and stimulate their activity. To achieve this, the teacher must be able to plan joint work, distribute tasks effectively, develop initiative and interest in learning a foreign language, and create a sense of need for knowledge. In addition, the organizational function is to streamline the activities of military specialists in foreign language classes and create favorable conditions for their active participation in the educational process.

The analytical and evaluative function is the ability of the teacher to analyze and evaluate the results of the educational process, identify achievements and shortcomings, compare their own work with that of colleagues, and seek ways to improve and increase the effectiveness of interdisciplinary learning. The analytical and evaluative function also involves systematic monitoring and assessment of military specialists' performance, analysis of their work, and making adjustments to curricula.

The communicative and stimulating function involves the ability to communicate, establish friendly relations, and encourage students to engage in active interdisciplinary learning by example. This function is designed to maintain motivation to learn, stimulate speech interaction, and foster a positive emotional climate.

The research and creative function is associated with the creative application of well-established pedagogical and methodological ideas in specific conditions of interdisciplinary learning, determining individual approaches to professional development, continuous improvement of teaching methods, the

introduction of innovations, and the development of creative abilities in both teachers and students.

In addition, we can distinguish the following professional functions of a foreign language teacher in interdisciplinary teaching:

- educational and pedagogical (teacher);
- constructive (course designer and materials provider);
- researcher;
- organizational (collaborator);
- evaluator (Fig. 3).

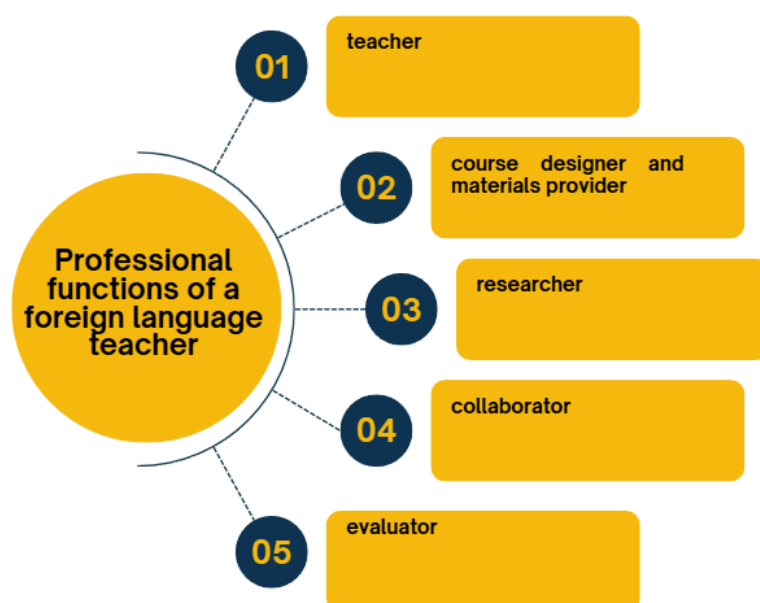


Figure 3. Professional functions of a foreign language teacher in interdisciplinary teaching

First of all, a foreign language teacher in interdisciplinary teaching is a philologist, a specialist in teaching a foreign language, whose main task is to form and develop students' foreign language communicative competence in oral and written forms, as well as practical foreign language skills in various types of speech activities, including in professional situations. The primary purpose of the teacher is to foster genuine, authentic communication in the classroom, drawing on the professional knowledge of military education students, and to prepare them for

effective communication in a foreign language in both oral and written forms within their future specialty. At the same time, the teacher should always show interest in the professional sphere of students, be able to listen attentively, and demonstrate a desire to develop.

The constructive function of the teacher is related to the provision of educational material and the development of the discipline's course. The provision of teaching materials is not only about selecting the right textbook and supplementary materials, but also about tailoring them to the learning needs of both the entire group of students and each individual, taking into account the specific characteristics of the educational institution and the level of language proficiency. Often, existing textbooks fail to meet the needs of military education students, the curriculum requirements, and the specifics of related disciplines. That is why the teacher must develop methodological recommendations, teaching aids, and study guides on their own to align them with the learning needs of a particular group and adapt them to the requirements of related disciplines. To develop an interdisciplinary training program, the teacher analyzes the needs of military education students, identifies the goals to be achieved at the end of the course, and determines the competencies – both linguistic and professional – that need to be developed in students.

A foreign language teacher in interdisciplinary teaching should also be a researcher to meet the needs of military education students. First, they should research their goals and needs to develop the interdisciplinary course program and design the teaching materials. In addition, the instructor should be willing to learn and improve throughout their life, including participating in international scientific and practical conferences and seminars, publishing in professional journals, attending advanced training courses, taking classes from other instructors, sharing experiences with colleagues, and engaging in self-education. For the successful implementation of this function, it is necessary to create appropriate conditions, including free access to information resources, the latest research in the field of military education, and the teaching of foreign languages.

The organizational function of the teacher is to implement the ability to organize learning activities for students, creating

conditions for achieving the desired results. To meet the learning needs of military professionals, teachers should work closely with those of related disciplines. This can be a regular form of cooperation in which the foreign language teacher receives information about the course program, its purpose, structure, or tasks that students will perform in their professional environment. The most effective cooperation occurs when a foreign language teacher and teachers of related disciplines consult with each other. In addition, the coordination of interdisciplinary projects and the creation of conditions for active student interaction in the learning process. At the same time, the foreign language teacher acts only as a consultant, a partner who helps military specialists develop the knowledge, skills, and abilities necessary for professional foreign language communication.

In the course of their professional activity, foreign language teachers in interdisciplinary education are involved in various types of assessment, including the evaluation of the achievements of military specialists, self-assessment of their own activities, and evaluation of the effectiveness of the course and teaching materials. The assessment of military specialists' achievements should be conducted both during and at the end of the course. The effectiveness of the course and its teaching materials should be evaluated during the course, at the end of the course, and after the course has concluded. This evaluation is very important for the instructor, as they often develop the course and learning materials independently. A vocationally oriented course is unique because it is impossible to create a single course that would meet the needs of all language learners. Thus, ongoing assessment is a crucial factor in creating a successful foreign language course in interdisciplinary learning, as it helps adjust learning strategies and maintain motivation for further development.

Thus, we agree with the researchers N. V. Shvets and O. V. Shvets that the role of a foreign language teacher in interdisciplinary teaching is key, as it is the teacher who acts as a facilitator of the integration of knowledge from different fields, motivates students to think comprehensively, and creates conditions for active interaction between disciplines. A foreign language teacher must not only have deep professional knowledge but also be open to new teaching methods, including project work,

team discussions, case studies, and the use of digital tools. He organizes the educational process in such a way that students learn to apply theoretical concepts in practice, analyze interdisciplinary problems, and develop critical thinking. In addition, the teacher supports the development of communication and technological competencies, creating a favorable environment for collaboration and self-development, which is the basis for forming a competent and adaptive military specialist in modern conditions (Shvets, 2025, p. 280).

Therefore, in interdisciplinary teaching, it is crucial that a foreign language teacher continually improves their professional skills. The effectiveness of integrating the language component into other fields of knowledge depends on the teacher's competence. They must be familiar not only with the methods of language teaching but also with the content of related disciplines in order to adapt the material to the professional needs of students of higher military education. This implies the ability to select authentic texts, create communication tasks that reflect real-life situations in the relevant field, and develop students' skills in using language as a tool for cognition and professional activity. Continuous professional development, participation in seminars, workshops, and scientific and practical conferences, as well as collaboration with colleagues from other specialties, contribute to the enrichment of the teacher's methodological arsenal. This approach enables learning to be more meaningful, motivating, and focused on achieving both academic and practical outcomes.

In implementing an interdisciplinary approach, teachers from different disciplines should familiarize themselves with the content of each other's programs in advance. When developing curricula, all teachers should work together in the same direction. The purpose of such cooperation should be a single integrated program in a particular specialty, which will enhance the gradualness of learning, expand the scope of the acquired knowledge; facilitate the acquisition of deep theoretical and special professional knowledge by students; eliminate unnecessary duplication of educational material, i.e. save class time for studying material in a special discipline and reduce the burden on the student.

Interdisciplinarity is one of the distinct features of the present and the future of research and development in higher education. The interdisciplinary approach, in a broad sense, and scientific understanding are innovative trends, but at the same time, a task that can only be solved through the purposeful work and interaction of all participants in the educational process (Hnezdilova, 2023). In other words, the teacher's work in implementing an interdisciplinary approach should focus on creating a unified system of knowledge, skills, and abilities for military education students that is consistent in content and structure. At the current stage of development of the system of training military specialists, the interdisciplinary approach can become a catalyst for the educational process in higher military education institutions, provide comprehensive and thorough preparation of future military personnel for professional activities, as it covers a wide range of issues: from the acquisition of theoretical knowledge and the development of practical skills and abilities to apply them to the formation of personal and professional outlook.

Through interdisciplinary training, military professionals learn to effectively use foreign languages to work with technical documentation, manage military systems, conduct negotiations, and participate in analytical and command and control processes. The Canadian experience demonstrates that integrating language education with engineering, technical, and research training enables a high level of adaptability and professional mobility among military personnel. For Ukraine, this approach is promising, as it contributes to the modernization of military education and the training of competitive officers capable of operating in uncertain conditions, communicating effectively, and implementing innovative solutions in the defense sector.

The advantages of interdisciplinary education lie in its ability to form a holistic view of complex phenomena and processes, develop students' critical thinking and analytical skills, and stimulate creativity through a combination of different approaches and methods. This learning format fosters a deeper understanding of the interrelationships between different fields of knowledge, enabling future military professionals to adapt to changing

environmental conditions, collaborate in interdisciplinary teams, and develop innovative solutions at the intersection of industries.

At the same time in Ukraine, the introduction of STEAM education in military training is gaining momentum, and it is already proving its effectiveness, as it fosters systematic thinking, the development of analytical skills, creativity, and innovation in solving military tactical and strategic tasks. The implementation of the STEM approach in the educational process of training military specialists requires solving certain rather challenging tasks. Thus, for the effective development of STEM education, the main tasks are as follows:

- training and professional development of academic staff;
- development of scientific and methodological support and introduction of modern teaching aids;
- expanding the network of regional STEM centers and laboratories;
- conducting scientific and applied research (STEM education), etc.

Not all of the above tasks can be fully fulfilled in the current conditions of a full-scale invasion, but, in our opinion, this is not a reason to abandon the STEAM approach - we should try to implement its capabilities through the forms available at this stage (Matsai & Gubska, 2023, p. 45).

The primary challenges in implementing interdisciplinary learning stem from the organizational, methodological, and personnel aspects of the educational process. Firstly, there are often difficulties in coordination between different faculties and teachers due to varying curricula, standards, and teaching approaches. Secondly, the insufficient level of training of teachers, who must possess knowledge in several fields simultaneously, makes it difficult to create high-quality interdisciplinary content. Thirdly, curricula sometimes have rigid boundaries that do not allow for sufficient flexibility to integrate different disciplines. Additionally, there are challenges in assessing learning outcomes, as various competencies must be considered. Finally, the lack of adequate facilities and financial resources may hinder the introduction of new technologies and methodologies that support interdisciplinary learning in military education institutions.

The need to update curricula and faculty qualifications is driven by rapid changes in professional requirements and technological advancements, which necessitate those educational institutions respond flexibly to the challenges of the times. The curricula should integrate new interdisciplinary approaches, combining linguistic and professional competencies to ensure comprehensive training of modern military professionals. At the same time, teachers need regular professional development to master the latest methods, digital tools, and interdisciplinary practices, enabling them to teach effectively and adapt the material to the needs of military education students. Such a systematic approach will ensure the quality of education, the relevance of knowledge, and the competitiveness of students in the modern, globalized, and digital world (Shvets, 2025, pp. 280-281).

We would like to emphasize that in Ukraine, the development of STEAM education presents significant opportunities for training qualified military professionals capable of generating innovative ideas and solving complex problems of the modern world. It also contributes to the country's economic growth and international competitiveness. Therefore, we should not abandon the implementation of this approach in Ukraine. The introduction of STEAM education at the international level has demonstrated numerous positive results that can serve as an example for other countries, including Ukraine. Countries with the successful implementation of STEAM education, such as Canada, the United States, Singapore, and Finland, have clear national strategies and programs that provide funding, resources, and political support to promote the systematic development and integration of STEAM education into curricula (Bocharova, 2024, p. 33).

For example, Canada is providing advisory assistance under the Promoting Reform Objectives through Technical Expertise and Capacity Transfer (PORTEST) project to audit the military education system in Ukraine and to conduct a comprehensive functional review of the defence management system in the Ministry of Defence and the Armed Forces of Ukraine. To this end, a Memorandum of Intent on cooperation was signed with the Canadian company Alinea International (Zelnytskyi, 2022, p. 77).

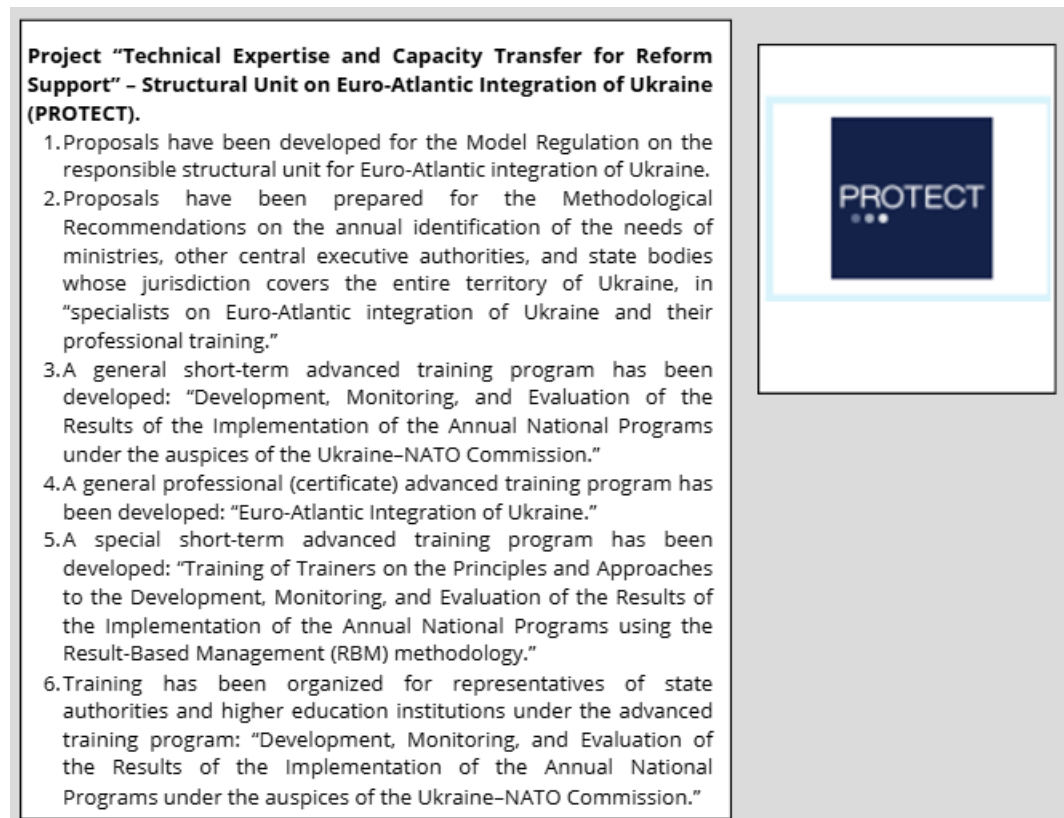


Figure 4. Content of the project "Technical Expertise and Capacity Transfer to Support Reforms" (Partners' Forum, 2021, p. 7).

It is worth noting that as part of this study, a survey was conducted among third-year students of the Hetman Petro Sahaidachnyi National Army Academy. The study involved 112 respondents, which enabled the identification of their attitudes towards the implementation of the STEAM approach, assessment of the importance of interdisciplinary training, and the role of a foreign language teacher in the development of professional and communicative competences.

Analyzing the survey results, several important trends have been identified regarding the perception and importance of the STEAM approach in training military professionals. Thus, 76% of respondents noted that integrating natural and mathematical subjects with humanities (including a foreign language) contributes to better learning and the development of interdisciplinary competencies. At the same time, 64% of respondents stated that the use of STEAM elements by foreign

language teachers (project tasks, working with digital tools, and situation modeling) directly increases motivation to learn. At the same time, 42% of cadets reported difficulties in using a foreign language when studying technical or tactical topics, which indicates the need for more practice-oriented classes. A significant proportion of respondents (58%) stressed the importance of developing intercultural communication competence, seeing it as a prerequisite for effective interaction with NATO partners. Additionally, 81% of respondents positively assessed the role of a foreign language teacher as a coordinator of interdisciplinary learning, facilitating the integration of knowledge from different fields in practical tasks. Only 12% of respondents expressed skepticism about the feasibility of implementing STEAM in military education, arguing that the curriculum is overloaded.

Thus, the results of the survey of higher military education students of the Hetman Petro Sahaidachnyi National Army Academy confirm the high relevance of the STEAM approach for the training of military specialists and emphasize the key role of the foreign language teacher in ensuring interdisciplinary integration and developing readiness for professional activity in the context of international cooperation.

Conclusions

The study demonstrates that adopting the STEAM approach in the training of military specialists, particularly within the Ukrainian–Canadian educational dialogue, redefines the role of a language teacher. The teacher becomes not merely an instructor but a multidisciplinary mentor who facilitates the integration of linguistic, technical, and professional components of learning. This transformation enables a shift from isolated subject teaching to a system in which language education contributes directly to the intellectual, communicative, and creative development of future military leaders.

The effective incorporation of STEAM principles into military education ensures that language learning is no longer a separate academic requirement but a functional instrument for professional growth. A competent foreign language teacher supports this integration by designing authentic communication tasks that link

them to real operational contexts and developing the analytical and intercultural skills necessary for participation in multinational missions. Through this approach, students learn to apply language as a means of cognition, coordination, and leadership in complex professional environments.

Sustainable progress in this field depends on the teacher's continuous professional development. Mastery of language pedagogy must be complemented by familiarity with military-specific terminology, engineering concepts, and digital technologies. Participation in research projects, methodological workshops, and interdisciplinary collaborations enhances the teacher's ability to tailor educational materials to contemporary military needs. This ongoing refinement of expertise ensures that the integration of language and professional education remains both pedagogically sound and practically relevant.

Canada's long-standing experience in implementing STEAM education confirms that an integrated and innovative model of learning is a decisive factor in building professional adaptability and technological literacy among military personnel. Ukraine, facing the challenges of modern warfare and global transformations, can effectively adapt these best practices by investing in teacher training, infrastructure, and strategic cooperation between education and defense institutions.

Ultimately, the STEAM-based paradigm equips future officers with not only linguistic and technical competence but also with creativity, analytical reasoning, and flexibility, qualities that define a modern professional capable of making informed decisions and engaging in effective international collaboration. The foreign language teacher, therefore, stands at the intersection of knowledge domains, acting as a key agent of transformation within the evolving system of military education.

References

Army in Canada: How to join the Canadian Armed Forces (2022). Immigrant. Today: website. URL: <https://ua.immigrant.today/canada/15929-canadian-armedforces.htm>

- Bocharova, N.A., & Dorosh, A.G. (2023). World experience in implementing the principles of STEAM education. *Actual aspects of STEAM education development in the context of European integration: collection of materials of the International Scientific and Practical Internet Conference* (Kropyvnytskyi, 21 April 2023). Kropyvnytskyi: DonDUiA, 389–391.
- Bocharova, N.A., & Kudriavtseva, O.V. (2024). International experience of STEAM education implementation: main aspects. URL: <https://lib.iitta.gov.ua/id/eprint/1741800/1/Збірник матеріалів 12-14 24%20 1.pdf>
- Dyson, T. (2022). *Organisational Learning and the Modern Army. A New Model for Lessons-Learned Processes*. 1st Edition. 272 p.
- Gnezdilova, K. M. (2023). Interdisciplinary approach to teaching professional disciplines as an innovative trend in the system of training future pharmacists. <https://doi.org/10.31651/2524-2660-2023-2-24-31>
- Hbur, Z., & Kravchenko, O. (2025). Development of STEM-education in Ukraine: prospects for building an innovative society. *Philosophy and Governance*, 6(10). <https://doi.org/10.70651/3041-248X/2025.6.03>
- Hutsul, L. I. (2024). Innovative approaches to teaching English in higher education: integration of technologies and communicative practices. *Philological Studies*, 104.
- Matsai, N., & Gubska, O. (2023). The relevance of STEM education for the training of modern specialists in the higher education system. *Bulletin of Luhansk Taras Shevchenko National University: Pedagogical Sciences*, 5 (359), 43-49.
- On the Concept of Development of the Security and Defence Sector of Ukraine: Decree of the President of Ukraine of 14 March 2016, no. 92-2016. 2016. No 92/2016. URL: <https://www.president.gov.ua/documents/922016-19832>
- Partners' Forum (2021). Cooperation and interaction with international organisations and international technical assistance projects. NAUCS. URL: <https://nads.gov.ua/storage/app/sites/5/Форум%20партнерів/spivpratsya-ta-vzaemodiya.pdf>
- Pinchuk, O., & Prokopenko, A. (2021). Development of digital competence as a professionally significant component of the training of officers of the Armed Forces of Ukraine. *Modern Information Technologies and Innovation Methodologies of Education in Professional Training Methodology Theory Experience Problems*, 54–69. <https://doi.org/10.31652/2412-1142-2021-62-54-69>
- Postova, K.G. (2024). Principles and patterns of STEAM education. "STEAM-education: from theory to practice": conference materials (Kyiv, 12-14 June 2024). Kyiv: Institute of Gifted Child of the National Academy of Pedagogical Sciences of Ukraine, 138-143.

- Prokopenko, A.A. (2022). Application of STEM technologies in professional training and retraining of military specialists. URL: <https://lib.iitta.gov.ua/id/eprint/732887/1/Прокопенко%20А.А.Тези%20підв.%20Стем.pdf>
- Shvets, N. V., & Shvets, O. V. (2025). Interdisciplinary approach to translator training: synergy of linguistics, cultural studies, etc. *In The 11th International scientific and practical conference "Science and technology: challenges, prospects and innovations"* (June 19-21, 2025), CPN Publishing Group, Osaka, Japan, 275-283.
- Vorona, T., Vorona, A., & Vorona, M. (2022). Language training of military personnel: foreign experience. *Military education*, 40–51.
- Voronin, A.I., & Trishchun, R.M. (2022). The Canadian military training system. *Innovative Pedagogy*, 53(1), 106–112.
- Zelnytskyi, A., Zabolotnyi, O., Vasyliiev, O., & Kornienko, V. (2022). Features of the formation of military personnel potential of the Armed Forces of Ukraine with the involvement of foreign instructors-teachers. *Military Education*, 71-84.