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FEATURES OF FORMATION OF ENVIRONMENTAL COMPETENCE OF EDUCATION SEEKERS IN THE CONTEXT OF PREVENTING ENVIRONMENTAL POLLUTION DURING WAR

Svitlana Tolochko, Nataliia Bordiug, Tetyana Les

The article contains the results of scientific research on the features of the formation of environmental competence of education seekers in the context of preventing environmental pollution during the war in Ukraine. The growing role of environmental competence of people is emphasized. Attention is paid to the protection of the environment in the context of armed conflicts and hostilities. The state of formation of ecological competence of students in the context of hostilities has been analyzed. A sufficient theoretical level of ecological competence formation has been testified along with a low degree of ability to apply knowledge of the safe behavior paradigm and implementation of health-preserving competence in difficult environmental circumstances. Theoretical and practical studies of Ukrainian scientists, starting with the armed conflict on the territory of Ukraine of 2014 have been considered. The length and specific focus on clearly defined environmental issues have been determined. The need to develop the ability of students to use the acquired knowledge in practice, particularly during the development of environmental programs or action plans for the restoration of areas, affected by hostilities, has been updated. The features of the formation of ecological competence of education seekers in the context of preventing environmental pollution during the war in Ukraine have been determined and analyzed. The world experience of conducting the educational process in war conditions has been analyzed. Suggestions are given on the need to minimize the time for preparation for training and reduce available resources in difficult times of war. The advice of psychologists on the peculiarities of the organization and implementation of educational and cognitive activities during the war has been given. The need to develop the ability to use the acquired knowledge in practice, particularly during the development of environmental programs or action plans for the restoration of areas, affected by hostilities, has been updated

Keywords: education seeker, environmental competence, structural and functional model

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1. Introduction

The aggression of the armed forces of the Russian Federation in Ukraine, heavy ground weapons, including long-range artillery, missiles, naval ships and military aviation, have resulted in heavy civilian casualties and damage to Ukraine's natural system. Results for the environment from the war (increased radiation background in the Chornobyl zone due to the movement of heavy armored vehicles and other vehicles on contaminated soils and raising radioactive dust in the air; destruction of oil depots by ballistic missiles throughout Ukraine and air pollution by open fire toxics over residential areas, damage of gas pipelines in settlements, powerful explosions and shock waves, damage to enterprises in various industries and the creation of chemical hazards to civilians and ecosystems) require appropriate measures to ensure environmental security in Ukraine. It is clear to the general public, that after the end of the war, environmental problems will continue to manifest themselves for a long time to come. During the war, more than a thou-

sand missiles were fired at Ukraine, more than 7,000 units of military equipment of various types were destroyed, that leads to the accumulation of carcinogenic garbage: spilled fuel, destroyed equipment and spent weapons, exploded missiles. The negative impact on the environment threatens the health and lives of all those who remain in Ukraine today and will continue to live. The debris, formed during the current shelling of buildings, poisons the air and burns the skin and other organs. Chemicals, released from damaged facilities and critical infrastructure, seep into the ground, poisoning soil and plants important to the food industry. Thus, damage to water, sanitation and hygiene infrastructure poses widespread health threats, including typhoid, cholera, dysentery, polio, and so on. Rising temperatures due to lack of centralized water supply and sanitation, the decomposition of thousands of corpses under rubble, catastrophic shortages of drinking water and food could trigger powerful and deadly epidemics, which are undoubtedly the result of environmental pollution.

2. Literary review

The analysis of psychological and pedagogical literature on the research topic showed its extensive study, practical mastering, application and wide interpretation.

Thus, the analysis of the state of reforming the Ukrainian educational system in the context of cross-border integration into the world academic space and the formation of transversal competencies of specialists of innovative business structures through education throughout life is represented in [1]. Current trends in the development of lifelong learning in the concept of higher education institutions are presented in [2]. Peculiarities of training specialists in the field of environmental protection for environmental monitoring in the system of postgraduate education are represented in [3]. The role of the workshop as a method of training future specialists in technogenic and environmental safety has been determined in [4, 5], educational hub as a space for professional and practical competence of environmental safety specialists is described in [6, 7]. Requirements for the content, forms, and methods of formation of ecological competence of students on the basis of axiology are given in [8, 9]. The proposals of the European Commission and the Council Recommendations on learning for sustainable development and environmental sustainability as a priority area of education and training policy are presented in [10, 11]. Learning for the future through the definition of competencies in education for sustainable development is disclosed in [12, 13], the report of the World Commission on Environment and Development on our common future is presented in [14]. The importance of conceptualizing the environmental citizenship for 21st-century education has been proved in [15]. The crisis of Israel and Gaza in 2014 due to hostilities and their impact on human security is revealed in [16]. The importance of strengthening environmental protection in the context of non-international armed conflict has been proved in [17], and the features of involving non-governmental armed groups to protect the environment during non-international armed conflicts are presented in [18]. The analysis of Rule 43 practices regarding the application of the general principles of warfare against the environment is shown in [19]. The view of the International Committee of the Red Cross on the protection of the environment during armed conflicts is analyzed in [20]. The danger of harm to the environment during armed conflicts is revealed in [21], and the need to protect the environment and the transition from conflict to peace has been proved in [22]. The impact of staff competence and hostility to the environment on the internationalization of small and medium enterprises is described in [23]. Opportunities for teaching in difficult circumstances and the practice of organizing and conducting educational and cognitive activities during military conflicts are disclosed in [24].

The analysis of the literature shows that global issues of sustainable development are the subject of discussion in many world organizations. The growing role of environmental competence of people is emphasized. Attention is paid to the protection of the environment in the context of armed conflicts and hostilities. However, the peculiarities of the formation of environmental competence of students in the context of

preventing environmental pollution during the war in Ukraine are unexplored.

3. The purpose and objectives of the study

The purpose of the study is to reveal the features of the formation of environmental competence of students in the context of preventing environmental pollution during the war in Ukraine.

To achieve this goal, the following tasks were set:

1) to study the current state of the formation of environmental competence of students in the context of hostilities;

2) to describe the requirements and recommendations for the educational process in wartime;

3) to identify and analyze the features of the formation of environmental competence of students in the context of preventing environmental pollution during the war in Ukraine and to develop a structural and functional model of the formation of environmental competence of students in the context of preventing environmental pollution during the war.

4. Materials and methods

The following methods were used to conduct the study: analysis and generalization of pedagogical, normative and methodological sources in order to identify a range of issues that require scientific and methodological support; methods of comparative analysis, interpretation and generalization of facts; comparative and analytical methods to analyze the environmental competence of students; method of system analysis for the development of methodology for the formation of environmental competence of students in wartime.

5. Research results and their discussion

5.1. The State of Formation of Environmental Competence of Education Seekers in the Context of Hostilities

The analysis of the current environmental situation in the world, and especially in modern Ukraine, highlights the growing requirements for the level of environmental competence of citizens in the context of overcoming the environmental consequences of war. Basing on the classic triad "nature – society – human", its popularity and value is determined by the current global environmental crisis. And to achieve a certain level of environmental competence is possible under the condition of its cross-cutting formation in the process of teaching and education and as a result of continuous self-educational activities. Environmental education is a relatively new branch of pedagogical theory and practice, the purpose of which is to ensure the implementation of basic general didactic provisions: systemacity and regularity, continuity and succession, humanization and scientific character, that strengthens the integrated function of academic subjects.

The urgency and social significance of the problem is determined by environmental problems: military actions in Ukraine, nuclear, radioactive, chemical security threats, damage to infrastructure, damage to ecosystems and Ramsar land devastation, violation of maritime and environmental law in the Black and Azov Seas. The above highlights the need

to develop the ability to use the acquired knowledge in practice, particularly during the development of environmental programs and action plans for the restoration of areas, affected by hostilities.

It is well known, that the occupation of Donetsk and Luhansk in 2014 and the creation of so-called "people's republics" led to certain environmental cataclysms in these areas. Domestic scientists have created an atlas of environmental problems in Donbass and ways to solve them "East Ecomap", which publicizes the region's environmental issues – air and river pollution, garbage dumps, forest fires, smoldering terricones, lost steppes and more. The interactive atlas provides detailed information on the above problems as well as a number of tools and techniques, needed to solve them. Awareness of its scale is necessary to solve the problem. The main goal of East Ecomap is to initiate dialogue, debate, discussion on ways and means of solving environmental problems through data collection, information, analytics, mathematical statistics on Donbass ecology, as well as to assist researchers and practitioners. After a full-scale invasion everyone can contribute to its content and to promote the solution of environmental problems in the context of overcoming the environmental consequences of the war.

In view of the above, scientist O. Ulitsky directed his efforts to studying the environmental problems of mines, flooded during the war. By analyzing applied biotechnologies, researcher S. Korsun, emphasizes the need for reclamation of land resources, damaged by war, applying the fertile layer, landscaping, and only then transfer it to local governments. Scientists O. Vasyliuk and I. Zagorodniuk have studied the ecological consequences of armed conflicts and their impact on biodiversity species.

The influence of hostilities on the state of objects of nature reserves has been studied by scientist V. Bondarev. Researcher M. Slobodyanyuk paid a lot of attention to documenting war crimes and crimes against humanity in Ukraine. She argues that to solve the problem it is necessary to develop programs from scratch and involve experts who will make accurate analyses, which will significantly update the project activities.

The formation of environmental competence of students in the context of the study is positioned as a purposeful process of developing experience, sense of personal involvement, responsibility and environmental values in the process of personally and socially significant educational and practical activities to solve environmental problems.

The current military actions in Ukraine have shown a sufficient theoretical level of environmental competence of citizens as well as awareness of global, Ukrainian and regional environmental issues. However, it is worth noting the low level of ability to put into practice the knowledge of the paradigm of safe behavior, both of their own and those who pose an environmental threat, and the implementation of health-preserving competence under difficult environmental circumstances. Components of health-preserving competence in this context, in our opinion, are: self-awareness as a subject of life with the necessary preservation of their own physical and mental health in hostilities, possession of socio-legal foundations of behavior in civil society, self-understanding, self-respect, self-improvement, self-

development, definition of adequate life goals, desire for realization; safe social interaction with other people with due responsibility for choices made or not made, for act or inaction; effective communication, close and business relations, understanding of the importance of public law, interest, adequate ways of interacting with people of different national, political, religious and social strata, self-control); safety daily activities (life-sustaining, educational, professional activities, practical skills and experience, etc.).

The shortcomings of modern environmental education in the context of hostilities are explained by the presence of contradictions between: the existing need of society in a favorable living environment and insufficient preparation of citizens for competent action to preserve and improve the environment during the war; the need to form the readiness and ability of students to act competently in problematic environmental situations and lack of skills and abilities to prevent environmental pollution during the war; the need for personal protective equipment, the ability to use them properly and the lack of the necessary quantity as well as practical skills of using them by the citizens of Ukraine, including those seeking education.

Therefore, the integral nature of knowledge of modern ecology, its focus on meeting the vital needs of people in the context of hostilities necessitate the "inclusion" of young people in solving environmental problems of the present and future, regardless of their professional choice.

The social effect of the qualitative formation of education seekers' environmental competence in the context of modern environmental challenges of the war will be manifested in the improvement of the nearest environment now and in the future; in educating conscious, environmentally competent citizens who are able to think critically and make competent decisions on environmental protection, especially on the preservation of their own health and life, as well as the environment; actualization of socially and psychologically significant functions of ecological education, culture, worldview; increasing social cohesion around solving environmental problems, caused by war; promoting the social development of students as participants of the reconstruction and qualitative transformation of the country.

The need to create the practice-oriented educational environment as a methodological and technological basis for the formation of environmental competence of students, critical analysis of global, state and regional issues, values, environmental responsibility and creative thinking in the context of environmental programs, action plans to restore areas, affected by hostilities, is updated. In this context, the implementation of the results of the study in the practice of teachers of general secondary, extracurricular, postgraduate pedagogical education as well as the activities of public authorities and local governments in the postwar reconstruction and formation of Ukraine's ecospace of the future are extremely important.

5.2. Characteristics of the Peculiarities of the Formation of Environmental Competence of Education Seekers in the Context of Preventing Environmental Pollution during the War in Ukraine

Currently, some world experience has been developed in conducting the educational process during the

war. Teacher K. Sovton shares the practice of organizing and conducting educational and cognitive activities during the conflicts in Palestine, Nepal, Nigeria, Lebanon, Somalia [24]. The proposals are based on the experience of teachers in difficult times of war and relate to the need to minimize time for preparation for classes and reduce available resources. Emphasizing the need for a quality environment, the author focuses on creating safe classes, particularly inclusive, on the efficiency in the student body, lesson planning and management, classroom management – groups with students with mixed abilities, leadership of different ages classes, extracurricular learning, training receptive and productive skills, teaching with and without textbooks, understanding and supplementing textbooks, creating one's own resources, using the local environment, making effective use of technology, teaching in difficult circumstances of hostilities. Especially important is helping students to unleash their potential through motivation and empowerment, testing, grading, helping to pass exams well. Integrative processes are implemented through the connection of educational institutions with the external environment, with the participation of parents and guardians, involving the local community, bringing the outside world into the classroom, supporting themselves and others, caring for their students and themselves, reflection on their own teachings, access to opportunities development.

As for the training itself during the war, psychologists provide a number of tips, including: a flexible approach to the selection of textual material (avoid texts, examples, vocabulary, etc. that are associated with unpleasant military experience); avoidance of stressful situations (extensive homework, assessments, attendance records); provision of psychological support, performing exercises for psycho-emotional stabilization of students (Telegram-channel "Support the Child", platform <https://tellme.com.ua/>); use of project work, related to the current situation in the country; concern for one's own resources and balance; awareness of the uniqueness of the time of acquiring knowledge to realize the opportunity to be useful to their homeland in the near postwar period. Peculiarities of formation of ecological competence of education seekers in the context of prevention of environmental pollution during the war in Ukraine are related to knowledge, skills, abilities and competencies on:

- environmental protection in accordance with treaties on international humanitarian law;
- identification of items necessary for the survival of the civilian population;
- protection of works and installations, containing life-threatening substances;
- protection of nature reserves;
- drawing up disarmament and weapons agreements;

- assessments of environmental protection by International Humanitarian Law and determining the way forward;

- expanding rules to improve environmental protection in non-international armed conflicts;
- determining the potential of other branches of international law to ensure the protection of the environment in the context of non-international armed conflict, etc. [17].

The author's system of formation of ecological competence in students is caused by the socio-ecological need for the formation of ecological competence in students in the context of preventing environmental pollution during the war

In our study, the structural and functional model of the formation of environmental competence is represented by three components: target and conceptual, activity and contextual, control and diagnostic (Fig. 1). Such a structure, in our opinion, allows you to systematically combine the purpose, factors, content, components, approaches, principles, stages, forms, methods, tools, the educational environment, and the result.

The conceptual and target component of the model includes two components, namely: purpose and factors.

The purpose of the developed structural and functional model is to form the environmental competence of students in the context of preventing environmental pollution during the war.

The main factors of this process are:

- threats to nuclear, radiological and chemical safety;
- threats to the destruction of environmentally hazardous enterprises and infrastructure facilities;
- problems of providing quality drinking water;
- problems of soil pollution, disturbance of landscapes and nature reserves;
- deterioration of the sanitary and epidemiological situation;
- problems of household and hazardous waste management.

Methodological approaches to the formation of environmental competence in education in the context of preventing environmental pollution during the war are identified as follows: systemic, competence-based, integrative, activity, synergetic, and prognostic.

The formation of environmental competence in students is carried out in accordance with the **principles of learning**: activity, situationality, creativity, continuity, innovation

These principles determine the **stages of formation** of environmental competence in students in the context of preventing environmental pollution during the war: values and motivational; theoretical and analytical; activity and practical.

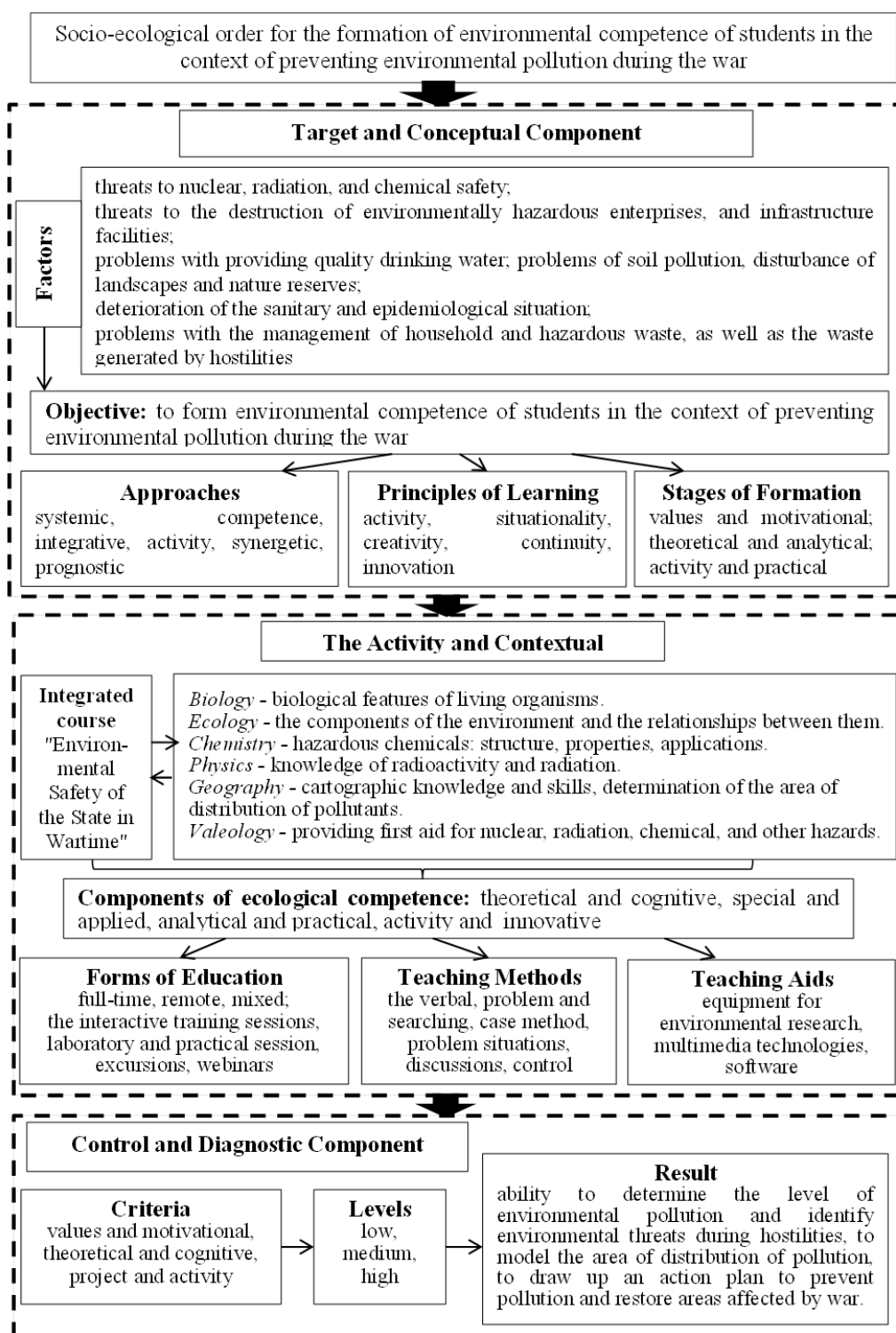


Fig. 1. Structural and functional model of formation of ecological competence in students in the context of prevention of environmental pollution during the war

The activity and contextual component includes an integrated course "Environmental Safety of the State in the Conditions of Hostilities", which is the integration of subjects/disciplines, namely:

- biology – biological features of living organisms;
- ecology – components of the environment and the relationship between them;
- chemistry – hazardous chemicals: structure, properties, applications;

- physics – knowledge of radioactivity and radiation;
- geography – cartographic knowledge and skills, determining the area of distribution of pollutants;
- valeology – first aid for nuclear, radiation, chemical and other hazards.

In addition, this component is represented by the following components of environmental competence: theoretical and cognitive, special and applied, analytical and practical, activity and innovative. It also contains

forms, methods and teaching aids. Among the forms of training in the process of formation of environmental competence in students in the context of preventing environmental pollution during the war, we define the following:

- full-time, remote, mixed;
- interactive training session, laboratory and practical session, excursions, webinars.

The teaching methods in the context of our study include the following: heuristic methods (explanation, lecture, story, heuristic conversation); problem and searching methods (questionnaire, conversation, discussion, testing, modeling, design and redesign of activities, role-play, case method, video method); research methods (research, diagnostic, visual, discussion, stimulation of creative activity); method of self-control and management of self-study (study of educational and popular literature; preparation of reports for participation in conferences, seminars, development of individual educational trajectory).

We used the following **teaching aids** in the formation of environmental competence in education in the context of preventing environmental pollution during the war: equipment for environmental research, multimedia technology, software.

The control and diagnostic component is represented by the following components: criteria, levels, result. Let's dwell in more detail on their characteristics.

Criteria for the formation of environmental competence of students in the context of preventing environmental pollution during the war are values and motivational, theoretical and cognitive, project and activity, which on their part determine three **levels** of environmental competence of students: low, medium and high.

The result of the process of formation of environmental competence in students in the context of preventing environmental pollution during the war in the specified structural and functional model is determined as the ability to determine the level of environmental pollution and identify environmental threats during hostilities as well as to draw up an action plan to prevent the pollution and restore the areas, affected by the war.

The represented structural and functional model of formation of ecological competence of education seekers in the context of preventing environmental pollution during the war encourages the active educational, cognitive and practical activity of teachers and customers of educational services, which, in our opinion, can be represented in **three directions**:

- conscious and purposeful **prevention** of threats to nuclear, radiation, and chemical safety; threats to the destruction of environmentally hazardous enterprises, and infrastructure facilities;
- continuous and effective **elimination** of problems in ensuring the quality of drinking water; soil pollution; accumulated household and hazardous waste and their uncontrolled distribution; waste, generated by hostilities;

– the systematic and effective **restoration** of territories (landscapes and nature reserves), affected by hostilities, and the state of the environment in general; improving the quality of life of the population, improving the sanitary and epidemiological situation; increasing the literacy of citizens in the management of household and hazardous waste, etc.

Therefore, despite the significant increase in the number of studies on the formation of environmental competence of educators, it should be noted, that recently there is a lack of educational initiatives to transform the problems of environmental and coevolutionary values and competence in the context of overcoming environmental consequences of war. The traditional environmental education ignores the issue of environmental change due to human activities and as a result of hostilities, the negative impact of the consequences of hostilities on the health of current and future generations of citizens of Ukraine.

Thus, the current difficult military conditions dictate a change in the priorities of the state and society in the formation of environmental competence of students as future professionals and participants in the reconstruction and qualitative transformation of the country. Environmental crimes, constantly recorded during hostilities, lead to rethinking and changing approaches to the formation of environmental competence. This determines the relevance and prospects of the most detailed research.

6. Conclusions

1. The current state of the formation of environmental competence of students in the context of hostilities has been studied. A sufficient theoretical level of ecological competence formation has been testified along with a low degree of ability to apply knowledge of the safe behavior paradigm and implementation of health-preserving competence under difficult environmental circumstances.

2. The requirements and recommendations for the educational process in wartime have been characterized. The world experience of conducting the educational process in the conditions of war has been analyzed. Suggestions are given on the need to minimize the time for preparation for training and reduce available resources in difficult times of war. The advice of psychologists on the peculiarities of the organization and implementation of educational and cognitive activities during the war has been considered.

3. The features of the formation of ecological competence of education seekers in the context of preventing environmental pollution during the war in Ukraine have been determined and analyzed. A structural and functional model which contains three main components: target and conceptual, activity and contextual, control and diagnostic has been developed.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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