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ENVIRONMENTAL KNOWLEDGE AS A COMPONENT OF PUPILS' ECOLOGICAL COMPETENCE

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У статті обґрунтовано важливість усвідомлення взаємозалежності між розвитком суспільства, станом природного середовища та змістом освіти для вирішення екологічних загроз і викликів; доведено, що природоохоронні знання мають загальнокультурну цінність, адже від рівня їхньої сформованості залежить розвиток екологічного світогляду, а, значить, і перспективи виживання людей та визначено, що географія краще за інші наукові галузі підготовлена до розробки основ стратегії збереження життєвого середовища людства. Для реалізації зазначеного напрямку важливим виокремлено формування природоохоронних знань учнів як складової екологічної компетентності задля змін у свідомості та поведінці особистості, гармонізації відносин у системі «суспільство-природа». Відповідно до цього, географічні аспекти природоохоронних знань охарактеризовано такими, що полягають, насамперед, у їхній просторовості (хорологічна парадигма) та взаємовідносинах із людським суспільством (парадигма сталого – стійкого, збалансованого – розвитку). Під екологічною компетентністю потрактовано інтегральний розвиток особистості, що об'єднує нормативний, когнітивний, емоційно-мотиваційний і практичний компоненти та забезпечує здатність виокремлювати, розуміти, оцінювати сучасні процеси, спрямовані на забезпечення екологічної рівноваги і раціонального природокористування. Найбільш сприятливим періодом для формування такої компетентності визначено середній шкільний вік. Аналіз науково-методичної літератури з проблематики дозволив виокремити три компоненти екологічної компетентності: особистісний, когнітивний, діяльнісний, а науковими підходами для розробки її теоретичних положень визначити – науковий, системний, ціннісний, нормативний, особистісно-діяльнісний. Доведено, що природоохоронна компетентність як складник екологічної компетентності за своєю сутністю є інтегративною; її ядро формується в шкільних предметах освітньої галузі «Природознавство» і як основа екологічної культури пронизує зміст інших шкільних предметів.

Ключові слова: учні, компетентнісний підхід, природоохоронні знання, екологічна компетентність, сталий (стійкий) розвиток, екологізація географії.

Problem statement. In the current conditions of the development of society, the problem of interaction between nature and society is becoming increasingly important. Humanity is beginning to realize the threat to the existence of civilization due to the uncontrolled impact on the environment. In order to solve environmental problems today, the interdependence between the development of society, the state of the natural environment and the content of education is being recognized. In this context, environmental protection knowledge has a general cultural value, because the level of their formation determines the formation of the environmental worldview and, therefore, the prospects for human survival. In geographical education the most developed

environmental protection issues in the 1960s and 1970s in parallel with the awareness of humanity of environmental problems and threats. Later it was transformed into the ecologization of geography, as a mirror image of a new line of research of modern geography – geoecology, which examines the main aspects of the relationship between society and the natural environment. Ecologization of school geography was carried out in accordance with the development of environmental ideas in modern geographical research: from environmental protection education and rational use of natural resources to the ecologization of the content on the basis of environmental issues. At the same time, geography is better prepared than other scientific fields to develop a scientific basis for the strategy of preservation of the living environment of humanity. Thus, for the strategic solution of environmental problems in 1992 in Rio de Janeiro at the World Conference of the UN, adopted the «Agenda for the XXI Century» was approved by the concept of transition of the world community to a balanced development as a response to global challenges. For the implementation of this direction is important is the formation of environmental protection knowledge of students as a component of ecological competence for changes in the competence and behavior of the individual, the harmonization of relations in the system «society-nature» for the improvement of the environmental situation.

Research and publication analysis. In the Ukrainian society, the environmental protection perspective in the content of geographical education traditionally is in the field of attention as scientists-geographers (A. Nekos, L. Nemets, S. Sonka, I. Chervaneva, etc.), and the teachers, methodologists (E. Kopyltsa, V. Korneeva, A. Plakhotnik, N. Pustovit, etc.) forming versatility of its study. Foreign specialists also strive to strengthen geographical positions in setting, solving and studying environmental problems – V. Zhekulin, T. Kucher, V. Maksakovsky, G. Miller, V. Nikolina, T. Savtsova, V. Sukhorukov, M. Rodzevich and others. The works of V. Bolotov, N. Bybik, I. Zimnoy, and A. Khutorsky explore the problem of the competency-based approach. The main approaches to the essence and structure of ecological competence are devoted to the research O. Kolonkova, O. Prutsakova, N. Pustovit, L. Rudenko, L. Titarenko, S. Shmalie and others. However, today the problem of the formation of environmental protection knowledge as a component of ecological competence of schoolchildren is insufficiently investigated, which is the **purpose** of this study.

The presentation of the main material. Humans are one of the many species that make up the living part of the Earth. But it is human activity that has changed the physical environment and the life of ecosystems on a local and global scale. Under these conditions, humans need to realize that the survival of humans and other species is impossible without the existence of a living global ecosystem. The human society depends on ecosystems of different scales, production of food, water and other resources. The ecological point of view involves understanding the links and relationships between forms of life, ecosystems and human society. Understanding and using spatial and environmental aspects helps geographers understand how to interpret nature and society on Earth. Thus, the geographical picture of the world encompasses the understanding of spatial structures and processes on Earth and the interaction of man and the environment. According to this, the geographical aspects of environmental protection knowledge, in our opinion, lie primarily in their spatial (chorological paradigm), that is, in the study of the spatial structures of ecosystems and their relationship with human society (the paradigm of sustainable (sustainable, balanced) development).

At the turn of the 90s, in the report on the materials of the doctoral dissertation «Problems of school geographical education in Ukraine (didactic and methodological aspect)», famous Ukrainian scientist A. Y. Sirotenko, characterizing the goals of geographical education, noted that his understanding of this issue is slightly different from the traditionally formulated one: «The goals of school geographical education are a set of humanitarian, social and natural knowledge necessary, first of all, to develop on their basis such skills and abilities that would be useful to a person throughout his life». In the scientist's opinion, «the aim of modern geographical education is, first of all, to prepare and educate a geographically literate citizen with such personal qualities that would provide him with the possibility of intelligent life» (Sirotenko, 1995, p. 12).

This saying has not lost its relevance today. In 2011, the State Standard for Basic and Complete General Secondary Education (2011) was adopted, which is based on individually tailored, competency-based and activity-based approaches, which are implemented in the educational sectors and reflected in the resultant components of educational content. Thus, the notion of «competency-based approach» is interpreted as «the orientation of the teaching and learning process towards the achievement of results, which are hierarchically ordered key, general and subject (sectoral) competencies». However, in the scientific basis of modern pedagogy the term «competency-based approach» is understood by most scientists as a set of actions that lead to the acquisition of competence of the one who learns and integrates a whole range of personal qualities: «the notion of competence includes not only cognitive and operational-technological components, but also motivational, ethical, social and behavioral ones». At the same time, under the conditions that educational activity is focused on the formation of competencies (as an indicator of the quality of education), the traditional «knowledge-based» approach in the teaching methodology does not lose its relevance. Since competence is, in fact, the ability to use knowledge productively, the formation of ecological competence is not possible without paying due attention to the formation of sound environmental protection knowledge.

In the present time, science has been developing various definitions and classifications of competencies, and their content has been varying. The vast majority of domestic scientists (O. Kolonkova, T. Nazarenko, N. Pustovit, and L. Rudenko, etc.), investigating educational environmental protection issues, distinguish ecological competence. At the same time, there is no common approach to the definition of ecological competence.

Thus, the State Standard for Basic Secondary Education (2020) refers to ecological competence as «awareness of the environmental foundations of environmental management, the need to protect nature, compliance with rules of conduct in nature, lean use of natural resources, understanding the context and relationship of economic activities and the importance of nature conservation to ensure the sustainable development of society».

In the context of our research, the approach revealed in the dissertation work of S.V. Shmaliy is seen as productive. Under ecological competence, the researcher understands the integral development of the personality, which combines normative, cognitive, emotional-motivational, and practical components and provides the ability to distinguish, understand and evaluate modern ecological processes aimed at ensuring ecological equilibrium and rational environmental management (Shmaliy, 2005). At the same time, in scientific publications, environmental protection competence is not studied separately but is taken as a synonym of ecological competence or as its component in environmental protection activities. Only in the dissertation of R.F. Galimov gives the author's interpretation of the concept of environmental protection competence of middle-level students of a rural school as a combination of natural-scientific and environmental-legal knowledge (regarding the legal regulation of relations between man and nature, ensuring the quality of the natural environment in agricultural production) moral principles, spirituality, citizenship, ecological mental skills, and environmental protection skills in relation to rural objects in general and agricultural production in particular (Galimov, 2012, p. 5–6). The author notes that the most favorable period for the formation of environmental protection competence is the middle school age. Students of middle school age are notable for their curiosity and desire for independent educational and search activities. They vividly respond to new information, begin to actively visit the school's circles, strive for collective work. This age is characterized by a restructuring of knowledge and ways of thinking, new motives for attitude to the environment. The structure of the environmental protection competence of R.F. Galimov is given in Table 1.

A summary of different approaches to understanding the concept of «ecological competence», depending on the need to emphasize certain aspects of the process of its formation, are suggested in the scientific and methodological guidebook "Formation of Ecological Competence of Schoolchildren».

Table 1

Structure of Environmental Protection Competence of Basic School Students

The main components	The scope of environmental protection competence
Fundamentals of natural and ecological and legal knowledge	Fundamentals of knowledge about the interrelations between living and nonliving nature, people and nature, environmental problems, and possible ways of solving them. Fundamentals of knowledge about the principles, rules, norms in relation to nature, people's right to a favorable environment, and ways to prevent harm to the environment. Fundamentals of knowledge in the legal regulation of relations between people and nature, ensuring the quality of the natural environment under conditions of agricultural production. Fundamentals of knowledge in environmental legal responsibility and legal mechanism of environmental protection.
Experience of emotional communication with nature	The ability to enjoy the beauty of nature, to experience positive feelings in relation to natural objects and phenomena. Ability to empathize with the damage caused to nature by human activity.
Environmental orientation of the individual	Demonstration of a sense of duty and responsibility for the preservation of the environment. The need for knowledge of the objects of nature and for moral actions in relation to it. Readiness to preserve the traditions of rational environmental management in rural areas laid down by residents.
Mental skills of ecological orientation	Basic skills for understanding the interconnection and interdependence of phenomena and processes, both natural and between society and nature. The ability to predict the consequences of human activity in the natural environment. The ability to assess local changes in the environment and predict their impact on nature as a whole.
Fundamentals of environmental protection skills	Primary experience in environmental protection activities. Primary experience in the protection of soils, forests, rivers in the negative impact of human life. Primary experience with limiting the use of household chemicals that damage the ozone layer.

In the context of our research it is relevant to consider ecological competence, which is understood as:

- personality's ability to situational activities in everyday life and the natural environment, when acquired environmental knowledge, skills, experience, and values are actualized into the ability to make decisions and perform adequate actions, realizing their impact on the environment;
- the ability to apply environmental knowledge and experience in professional and life situations, guided by the priority of environmental values and the non-pragmatic motivation to interact with the environment based on the awareness of personal involvement in environmental problems and responsibility for the environmental consequences of their own professional and household activities (Pustovit, 2008).

As we can see, the basis for the formation of ecological competence is the acquisition of environmental knowledge, skills, experience and values.

An analysis of the methodological literature on this subject allows us to identify three components of ecological competence that are formed in the basic secondary school: personal, cognitive, and activity competence. The personal component is aimed at realizing oneself as a part of nature, ensuring the conscious conduct of a healthy lifestyle and its role for the self-development of the person, contributing to the formation of personal competence of students; ensures that

schoolchildren understand the essence of a person, the norms of his behavior. The basis of the ecological worldview is the cognitive component, which is expressed in the worldview and world understanding of man. The activity component provides schoolchildren with worldview knowledge in the process of forming a natural-science picture of the world on the basis of scientific knowledge about nature, which is the basis for the formation of the ecological competence of students.

Theoretical statements, which define the process of forming ecological competence, provide grounds for identifying the leading approaches in their development. Such approaches are: – scientific – covers concepts, regularities, information that characterize and define the interactions in the system «human-nature-society». Ensures the scientific and innovative nature of knowledge in the process of environmental training; the systemic approach – is focused on understanding environmental training as a holistic entity that has content, structural, and functional connections; the value-based approach – is based on the necessity of a responsible attitude to the natural environment and personal contribution to the preservation of nature; normative – aimed at assimilating the totality of environmental norms, laws, rules governing educational activities; personal-activity – ensures the formation of environmental activity (Sharko, 2011, p. 42, 43).

The analysis of school practice revealed a lack of use of the powerful integrative potential of geography in the formation of environmental knowledge; teachers of biology are traditionally more active in the organization of school environmental education and activities. At the same time, the aggravation of the environmental situation is caused by an increase in an anthropogenic influence on nature, and geography is the only science that applies simultaneously to the systems of natural and social sciences. Therefore, it is in the lessons of geography that the opportunity arises to most fully, comprehensively, and adequately consider environmental problems and nature protection as a way of solving them in the system of relations between society and nature. After all, environmental problems have long been classified as national and global. From purely biological, they have become social, ethical, psychological, pedagogical, and, of course, geographical.

Environmental protection competence is interdisciplinary and inherently integrative because it is formed in the process of learning biology, geography, physics, chemistry, natural history, ecology, the basics of human life safety, and on the basis of synthesis of knowledge, skills, and scientific and value settings acquired during their study. The content of any school subject is directly or indirectly related to environmental protection issues: for example, the study of environmental protection legislation at the lessons of law, the historical experience of nature transformation and its consequences for the life of individual nations at the lessons of history, the formation of a solicitous attitude to nature through the works of literature and art, etc. According to our understanding, the core of environmental protection competence of basic school students is formed in the educational field of «Nature Studies», but through the environmental culture, it permeates the content of the subjects of other educational fields. This is consistent with the approach of O.O. Prutsakova, who defines ecological competence of schoolchildren as «...the appearance of environmental culture in the responsibility of an individual». (Prutsakova, 2009, p. 133).

We consider environmental protection competence as a part of ecological competency. In most scientific research, ecology is a body of knowledge, and nature conservation is a set of knowledge and actions, which is congruent with the convergence of such pedagogical categories as «competency» and «competence», where the latter includes actions based on acquired competence. We consider it appropriate to draw an analogy: ecology is competency, and nature conservation is an actual competence, which is realized in the process of interaction between people and nature. Accordingly, ecological competence is a practical activity of nature conservation. Therefore, in our opinion, environmental protection knowledge, in addition to personal environmental knowledge, must include knowledge about the ways and experience of environmental protection activities. So, V.V. Kraevsky and I.Ya. Lerner, considering knowledge as a separate element of the content of training, point to «knowledge about nature, society, technology, man, ways of activity» (Lerner, 1983, p.146).

Traditionally, in normative legal documents governing the study of geography at school (State standards, curricula), issues related to the geographical aspects of the relationship between man and nature are identified as a separate block in the basic school. From the geographical component of the educational field «Natural Science» one can distinguish environmental protection knowledge, the formation of which is provided for by the State Standard for Basic and Complete General Secondary Education, revision 2004 (Table 2).

According to our approach, the content of this edition of the standard can be considered as a geographical component of the ecological by name and «environmental» by the essence of the competency of the students of the basic school.

Table 2

Geographical component of environmental protection education in basic school

The content of education	State requirements for the level of general educational training of students
Geographic aspects of the interaction between people and nature. The relationship between people and nature, and its consequences. The main planetary problems, their global nature, and their manifestation on certain continents and on the territory of Ukraine. Ecological problems, their regional manifestation, ways of solving them. International cooperation in solving global problems.	An idea of geographical aspects of the interaction between nature and society in the past and at the present stage. Knowledge about the main problems of interaction between society and nature, their manifestation within the limits of separate continents and on the territory of Ukraine. The ability to give examples of the mutual influence of man and nature, to explain ways to solve geo-environmental regional problems; follow the rules of behavior in nature.

In the 2011 State Standard for Basic and Complete General Secondary Education, the geographical component maintains both traditional environmental protection lines related to the problems of interaction between society and nature, and new ones appear; above all, the principles of sustainable development (Table 3).

From the above, it can be concluded that this version of the standard, which is based on a competency-based approach, has significantly expanded the state requirements for the level of general educational training of students, but not due to the volume of knowledge, and due to the growing requirements for the formation of skills to apply them, for the development of critical thinking skills (analyze, express judgments, evaluate the meaning). However, in our opinion, it is impossible to form these competencies without the formation of sound knowledge. For example, it is unlikely that a student can follow the rules of behavior in the natural environment without knowing them; or how can you assess the importance of sustainable development for humanity without first becoming familiar with it and without having studied the very concept and principles of sustainable human development. Therefore, this standard rather places emphasis on the requirements for the level of formation of knowledge, which should guide the teacher, on which from the cognitive levels (according to the taxonomy of Benjamin Bloom's pedagogical goals) they should be learned (memory, application, analysis, synthesis, assessment).

Table 3

Geographical component of environmental protection education in basic school

The content of education	State requirements for the level of general educational training of students
Geographic aspects of the interaction between people and nature.	know* the principles of interaction between society and nature, classification of natural resources, benefits and consequences of their use, conservation methods;

Geographical environment as a sphere of interaction between society and nature. Geography of natural resources. Environmental management and its consequences. Geography of global human problems and ways to solve them.	understand the patterns of natural resource expansion, the essence, and causes of global human problems; be able to explain the problems and prospects of using natural resources; analyze the geography of natural resources and global problems, territorial differences in solving modern challenges of mankind; follow the rules of behavior in the natural environment, safety precautions to be taken in case of natural and man-made disasters; apply knowledge about the interaction between people and nature to implement the practical goal of adaptation to the conditions of living in a certain area; express opinions on the ways of rational environmental management and solving current environmental problems; assess the importance of sustainable development for humanity
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* Note – keywords in government requirements was highlighted by us

In the current State Standard for Basic Secondary Education 2020, ecological competence of natural education has already been identified as one of the keys in the form of skills and attitudes (Table 4).

Table 4

Competence potential of ecological competence

Key competencies	Skills and attitudes
Ecological competence	Skills: identify and analyze environmental issues make responsible and saving use of natural resources respond to environmental challenges initiate the solution of local environmental problems, implement environmental projects predict the environmental consequences of human activity Attitudes: awareness of the importance of rational environmental management assessment of own actions in nature from the standpoint of life safety, ethical standards, and principles of sustainable development of society appreciation of the diversity of nature, recognition of life as the highest value

In 1977, the first intergovernmental conference on ecological (environmental) education in the world, organized by UNESCO in cooperation with UNEP and held in Tbilisi, identified the components of environmental education, which are:

- awareness and sensitivity to the environment and problems of the environment;
- knowing and understanding how the environment functions, how people interact and how they depend on the environment, and how environmental problems can be addressed;
- attitude – concern for the environment and personal motivation and tendency to participate in improving and protecting the quality of the environment;
- skills to identify and investigate environmental problems and contribute to their solution;
- active participation in measures aimed at solving environmental problems.

According to our understanding, these are actually the main components of ecological competency (or more precisely, environmental competence, since it concerns the environment), among which knowledge and comprehension are given one of the leading roles. Environmental protection knowledge is also an informative aspect of the formation of ecological competency because without it is impossible to create the rest of its components (skills, abilities, experience, and values).

Conclusions. Therefore, in view of the above, it can be concluded that the relevance of the issue of environmental protection knowledge formation as a component of the ecological competence of students is due to the aggravation of the environmental situation in the world. In the Ukrainian geographical education the environmental protection problems gained the most momentum in the 1960s – 1970s in parallel with the awareness of the humanity of environmental problems and threats. Later it was transformed into the greening of geography, as a mirror image of a new line of research of modern geography – geo-ecology, the object of study of which is the relationship between the natural environment and society. At the same time, geography is better prepared than other scientific fields to develop a scientific basis for the strategy of preservation of the living environment of humanity. Given this, the geographical aspects of environmental protection knowledge, in our opinion, lie primarily in their spatial (chorological paradigm), that is, in the study of the spatial structures of ecosystems and their relationship with human society (the paradigm of sustainable (stable, balanced) development). Environmental knowledge itself is acquired by schoolchildren by obtaining environmental and geographical information and, together with experience in environmental practice, is the core of their ecological competence. By ecological competence we mean the ability of a person to act situationally in everyday life and the natural environment, when the acquired environmental knowledge, skills, experience, and values are actualized in the ability to make decisions and perform adequate actions, realizing their consequences for the environment. At the same time, its component is integrative environmental protection competency, which is formed in the process of studying school subjects in the education field «Natural Science» of the natural cycle. Environmental protection knowledge also acts as an informative aspect of the formation of ecological competence as without them it is impossible to create the rest of its components (abilities, skills, experience, and values).

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ENVIRONMENTAL KNOWLEDGE AS A COMPONENT OF PUPILS' ECOLOGICAL COMPETENCE

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The article substantiates the importance of understanding the interdependence between the development of society, the state of the environment, and the content of education to address environmental threats and challenges. It is proved that environmental knowledge has a general cultural value. It is because the level of their formation depends on ecological worldview development, and hence the prospects for human survival. It is determined that studying Geography allows developing the basics of the strategy of preserving the living environment of mankind. The formation of pupils' environmental knowledge as a component of ecological competence is essential for changes the individual's consciousness and behavior, the harmonization of relations in the system 'society-nature'. Accordingly, the geographical aspects of environmental knowledge are characterized by those that consist primarily in their space

(chorological paradigm) and relationships with human society (paradigm of durable-sustainable, balanced development). Ecological competence refers to the integral development of personality, which combines normative, cognitive, emotional-motivational, and practical components, and provides the ability to identify, understand, and evaluate modern processes aimed at ensuring ecological balance and rational use of nature. The most favorable period for the formation of such competence is definitely the middle school age. Analysis of scientific and methodological literature on the issue allowed identifying personal, cognitive, and activity components of ecological competence. Scientific approaches to develop its theoretical provisions are scientific, systemic, value, normative, and personal activity approaches. It is proved that environmental competence, as a component of ecological competence, is inherently integrative. Its core is formed while teaching school subjects related to the Natural Science educational field and as the basis of ecological culture permeates the content of other school subjects.

Keywords: *pupils, competence approach, environmental knowledge, ecological competence, sustainable development, ecology of geography.*

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