

ORIGINAL ARTICLE

TRAINING OF FUTURE PROFESSIONALS FOR SUSTAINABLE DEVELOPMENT

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Halyna V. Bilavych¹, Uliana Z. Borys², Oleg Ja. Dovgij¹, Andrii B. Savchuk¹, Nadiya O. Fedchyshyn³, Larysa Ya. Fedoniuk³, Borys P. Savchuk¹

¹VASYL STEFANYK PRECARPATHIAN NATIONAL UNIVERSITY, IVANO-FRANKIVSK, UKRAINE

²KOLOMYIA PEDAGOGICAL PROFESSIONAL COLLEGE OF THE IVANO-FRANKIVSK REGIONAL COUNCIL, KOLOMYIA, UKRAINE

³I. HORBACHEVSKY TERNOPIL NATIONAL MEDICAL UNIVERSITY, TERNOPIL, UKRAINE

ABSTRACT

The aim of the research is to develop the educational recommendations for acquiring environmental knowledge of future specialists on the basis of the analysis of the educational state of ecology in the theory and practice of higher education.

Materials and methods: During the research, a group of methods was used. It consisted of the theoretical (specific search) methods i.e. analysis, comparison and generalization of scientific literature on the problem of research to systematize and summarize the facts, information, materials on the problem under study and determine the essence of basic concepts; structural and functional methods i.e. analysis of the content of curricula, textbooks, manuals, dictionaries, directories, etc.).

Results: Future experts were interviewed to evaluate their environmental and professional orientation and level of environmental knowledge. The questionnaire was aimed at clarifying the following problems: determining the level of environmental knowledge of future specialists for sustainable development; attitude of students to environmental problems; determination of the level of ecological consciousness, environmental activity of students. The questionnaire was created on the Google Forms online resource and was used both online and in the standard standard face-up form in the test form filling at the classrooms. The respondents were students receiving engineering, biological and pedagogical education. The age of the participants in the experimental study reached 18-22 years. The ratio of men and women at this stage of the experiment varied within the following limits: 34.66% of male and 65.34% of female (150 persons in total).

Conclusions: The great responsibility for the environment and the future gene pool of the nation rests not only on state structures but also on educators, the public, the church and other factors. We suggest, the path to the ecological culture lies through effective environmental education, through the greening of citizens' consciousness. Therefore, in time, the reorientation of the educational system content in the dimension of sustainable development, which envisages its greening in the first place i.e. the development of environmental thinking, the acquisition of environmental knowledge, the formation of environmental behaviors so that children and adolescents can nowadays and in the future be able to satisfy their needs in safety of nature, without harming it, took care of the environment, about their own health and safety, acted in the environment and made appropriate decisions not as consumers but as conscious citizens.

KEY WORDS: nature conservation, health care, education greening, environmental issues

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INTRODUCTION

At the turn of the millennium, all of humanity has been united around the idea of sustainable development: it is viewed as the ideology of the survival of human civilization. Traditionally, sustainable development is understood as systematically managed development, the basis of the controllability of this complex process i.e. a systematic approach, modern information technologies that allow not only creating different models and variants of directions of development quickly, but also making forecasts of their results and choose the most optimal variant of economic development with high accuracy. Sustainable development is a complex and multidimensional concept. It is an economic development that is comprehensively balanced, with high requirements for environmental protection, environmental security, social justice, ensuring the elimination of exploitation, poverty and discrimination,

etc. In the 80's of the XX century the world community is raising the issue of sustainable development, eco-development as development without destruction, the need for sustainable development of ecosystems. For example, in 1987, the International Commission on the Environment and Development (ICSID), chaired by ex-Prime Minister of Norway H. Brundland, in his report, "Our Common Future," raised the issue of "sustainable development" and clearly defined its content: it such a development that not only provides the needs of today's generation of people, but also does not impede the ability of future generations to meet their own needs [1].

These ideas, formally proclaimed in the 21st Century Agenda 21 (Agenda 21), approved at the 1992 International Conference on Environment and Development in Rio de Janeiro (United Nations Conference on Environment and Development (Earth Summit)) and socio-economic de-

velopment, high quality of the environment and a healthy economy for all peoples of the world, meeting the needs of people and maintaining sustainable development for a long period [1]. All subsequent definitions of the concept were based on this interpretation of sustainable development. Thus, environmental security qualifies as part of the national and global security of mankind. However, after all the Rio de Janeiro Conference, despite all the declarations to achieve a balance between economic growth, social community and the environment, this has not happened. On the contrary, the situation has worsened and is becoming more and more complicated every day, and the question of the conservation of the biosphere and of civilization, in general, remains open. We consider the urgency of the problem not only in the planetary context, but also in the state dimension.

Greening education, which involves the formation of a person with a high level of environmental culture, is an important pedagogical problem; it is one of the leading areas of the profession of future specialists' formation. It can be received by mean of education at the higher schools. Therefore, it is important that students acquire knowledge in the general laws of the development of nature and society, nature conservation and management, correct understanding of the relationship between the existence of a human and nature, to be able to subordinate their activities to the requirements of rational nature management. Meanwhile, the national higher educational system requires a thorough, deep (rather than formal / superficial) greening of content. On this basis gradual transition to education can be pursued for balanced development, which implies a higher level of consciousness, spirituality and ecological culture. In today's consumer society, we must oppose the alternative of a high-spirited, educated generation of young people who care about their future, their children, and humanity in general [2]. We are convinced that in such circumstances we can positively solve the global environmental problems that face not only Ukraine but also human civilization. In order to address global environmental problems, Ukraine must contribute to the implementation of the Balanced Development Concepts productively, where the environmental education is a top priority. The current Environmental Education Concept (discussed below) and the mechanisms that have been implemented give reason to suppose that Ukraine has sufficient potential (environmental educational experience, educational system, relevant regulatory framework, qualified personnel, etc.) that is capable and must be activated in terms of implementation Sustainable development concepts.

Since the beginning of the XXI century environmental problems in particular have worsened due to the deterioration of the environmental situation in the world and regions of Ukraine, the question of nature conservation, nature protection, the formation of nature conservation behavior skills has become acute, since it started in the family, pre-school, and therefore continued in school. Environmental education should naturally and logically be continued in higher education. The complexity of this process is due

to the fact that adolescence enters an independent life in an era of not only the rapid development of innovation, science, technology, but also those challenges that are associated with the risks that are triggered by the negative effects of the scientific and technological revolution, the demographic explosion, etc. Therefore, the young man of the 21st century needs a new philosophy of life, a high level of ecological culture, and formed environmental skills. Formation of personal ecological culture is caused not only by the need of time, it is also an important pedagogical problem. However, as we will show below, higher educational institutions do not fully provide such training today.

Basic educational documents also emphasize the importance of environmental education for the growing generation. «Environmental Education Concept», adopted in 2001 in Ukraine, which is based on the Law of Ukraine «On Environmental Protection» (in particular Article 7 «Education and Education in Environmental Protection») [3] emphasizes: “The ecological world, as a holistic cultural phenomenon, including processes of education, upbringing, development of personality, should be directed to the formation of ecological culture... greening of educational disciplines and training programs, as well as to professional ecological training through basic ecological education” [3]. Also important for us is Article 71 of this Law «Participation of Ukraine in international cooperation in the field of environmental protection» (section XVI. International relations of Ukraine in the field of environmental protection), since it reflects the international context of environmental protection of our country [4]. However, there are still no effective mechanisms for greening education, so a number of recommendations from the Environmental Education Concept and the Law of Ukraine “On Environmental Protection” on practical implementation in the field of greening education are not fully implemented to date, in particular in accordance with the main provisions of international instruments i.e. sustainable development. We see this as a problem, because Ukraine, by declaring its course on European integration, has joined international forums that recognize education as «the basic element of society's transformation to sustainable development» and the «foundation of sustainable development». The Strategy of the European Economic Commission for Education for Sustainable Development, adopted in 2005 in Vilnius (Lithuania), emphasized the actualization of the issue of sustainable development and obliged all alliance members to intensify the practical measures for the implementation of the Decade of Education for Sustainable Development (until 2014). The document (Strategies of the United Nations Economic Commission for Europe (ECE) on Education for Sustainable Development (ODA)) The UNECE Strategy for Education for Balanced Development, in particular, states that national Action Plans should be a key element of its implementation. the state of affairs of the country and the basic documents on CSF for all levels of education have been developed and approved. The UNECE strategy at that time directed the Ministry of Education and Science, the Ministry of Nature of Ukraine to create a thorough research

on strengthening the links between the natural, economic, social and political sciences, maximizing their greening, taking into account the principles of balanced development in educational curricula teacher training courses, creation of interdisciplinary projects, etc. Ukraine, as early as 2001, adopted the Concept of Environmental Education, the very beginning of the 21st century is a successful and productive period of realization of the defined goals and educational policy. However, after 20 years, there is a certain setback for the development of a legal framework in the field of greening education: unfortunately, the Law on Environmental Education has not yet been adopted, neither the Concept of Education for Sustainable (Balanced) Development, nor the Concept of Sustainable (Balanced) development.

We are now following the serious steps of Ukraine at the state legislative level. In 2019 the Law «On the Fundamental Principles (Strategy) of the State Environmental Policy of Ukraine for the Period up to 2030» [5] was adopted, which is the state's answer to the challenges that led processes of globalization and social transformation. Ukraine, on the one hand, clearly stated the priority of environmental protection, environmentally balanced use of nature, on the other hand, outlined the root causes of environmental problems, including the subordination of environmental priorities to economic feasibility; *low level of understanding in society of the priorities of environmental protection and the benefits of balanced (sustainable) development, the imperfection of the system of environmental education and education (highlighting is ours. - Ed.);* unsatisfactory level of compliance with environmental legislation and environmental rights and obligations of citizens; insufficient funding from state and local budgets for nature conservation measures, funding for such measures on a residual basis, etc. [5].

The analysis of this Law gives grounds to state that the State Environmental Policy Strategy of Ukraine until 2030 is in line with the ideas of ensuring environmentally balanced use of nature, in particular, the United Nations General Assembly Resolution «Transforming our world: a 2030 Agenda for Sustainable Development».

According to the above state documents the drama and complexity of the situation, among other things, is that the leading tasks of environmental education are the formation of ecological culture by means of formal and non-formal education of all segments of the population, especially heads of different ranks, production managers; training environmental specialists for all sectors of the economy without exception; the strategic task is to develop its scientific foundations. Meanwhile, the theoretical, methodological and educational foundations of environmental education at the higher educational establishments require a thorough analysis of the problem with training a specialist (teacher, ecologist, engineer, diplomat, etc.) as a person of a new type, new environmental thinking, capable of developing an eco-friendly society, capable of solving the problems of nature.

Therefore, despite the fact that greening is one of the strategic directions of education, the results of the anal-

ysis of the current state of the educational environment at the higher schools indicate that the content and structure of the environmental component are insufficiently implemented. Here are the arguments. For example, the subject «Fundamentals of ecology» is one of the optional disciplines for the students, and environmental knowledge is not a necessary component of competencies. Moreover, the introduction of only this discipline into the curricula of the universities is not able to realize the environmental education of future specialists.

The problem of the current educational situation is that the actual termination of teaching «Fundamentals of environmental knowledge» in general education institutions is a prerequisite for a critical situation, which can predict the lack of means of ecological consciousness formation, the preservation behavior of students with a form of education with a form of education. nature, responsible for the environment, cares about the future of his family, his state, the world community. In such circumstances, the sustainable development of Ukraine may be in danger.

THE AIM

The aim of the research is to develop the educational recommendations for acquiring environmental knowledge of future specialists on the basis of the analysis of the educational state of ecology in the theory and practice of higher education.

MATERIALS AND METHODS

During the research, a group of methods was used. It consisted of the theoretical (specific search) methods i.e. analysis, comparison and generalization of scientific literature on the problem of research to systematize and summarize the facts, information, materials on the problem under study and determine the essence of basic concepts; structural and functional methods i.e. analysis of the content of curricula, textbooks, manuals, dictionaries, directories, etc.) to substantiate the structure, content, principles of construction of the methodology for the formation of environmental knowledge; scientific and pedagogical examination of educational materials, with the help of which the conceptual and terminological apparatus, content and structure of environmental protection knowledge of future specialists were defined and elaborated, the method of their formation in the process of studying individual disciplines, extra-curricular work was developed; experimental-empirical methods i.e. pedagogical observation, conversation, interviewing, questioning and testing of students and teachers to determine the state of the problem and substantiation of methodological approaches for acquiring students' environmental knowledge; statistical and mathematical methods i.e. mathematical and statistical processing of data of pedagogical experiment, systematization and generalization of its results.

Experimental research base. The researches were conducted during 2017-2019 on the basis of the State Higher

Educational Institution “Vasyl Stefanyk Precarpathian National University”. The experiment involved 150 students.

RESULTS AND DISCUSSION

The study was conducted in several stages. At the theoretical and diagnostic stage the state of development of the problem in the scientific literature was studied; the international documents on environmental protection and sustainable development were researched; the national pedagogical experience was analyzed and summarized; the ascertaining experiment carried out through interviews, questionnaires, observations, conversations, which resulted in obtaining baseline data on the state of environmental knowledge of future specialists; it was analysed the results of students learning environmental knowledge in the course of study at the university, their attitude to environmental conservation activities. It was also developed the theoretical and methodological principles for creating an ecologically rich environment for the formation of environmental knowledge and ecologically appropriate behavior of specialists in the educational process of higher education and in non-audit work, formulated conclusions and developed methodological recommendations.

The results of the theoretical and diagnostic stage of the study give grounds for the following conclusion: the issue of ecological education of children and adolescents has always been in the field of view of Ukrainian researchers, in particular, scientists have not best studied the environmental education of students in teaching Geography [6; 7; 8]. It was revealed the general pedagogical and psychological aspects of ecological education of children and adolescents, issues of theory and practice of formation of responsible attitude to the environment during the lessons of geography. The scientists mentioned above, referring to the creative achievements of famous scientists-psychologists A. Leontiev, S. Rubinstein, emphasize that only a person who has understood himself as part of the universe is psychologically prepared for future environmental activity.

A special place in the source database belongs to the property of S. Sovgira, who devoted his works to the formation of ecological culture of students-biologists (the criteria for selection of content and construction of environmental education and upbringing of students of higher educational institutions of biological profile, as well as the problems of ecological studies). H. Bilyavsky, T. Sajenko, O. Pashchenko [2], V. Korneev [9] and others who have researched the problems of greening school education and also analyzed the issues of greening of higher education. Foreign experience of ecological education was studied by N. Bidiuk, I. Zadorozhnaya, T. Kuchay, G. Marchenko, Y. Polyakova (Great Britain), D. Kvasnychkova (Czech Republic), O. Romanov (Belarus), I. Rudkovskaya (Germany), D. Cikhi (Poland) and others.

In the context of our study concept, the opinions of scientists from the United States, the United Kingdom, and Europe, which actualize the problem of environmentally sound behavior (Brennan, 1986; Cunningham, 2005; Judy,

1993; James, 1974, etc.) are rather important as their aims were needs for human communication with the environment, protection from pollution and destruction; the person in his activities and relations with nature shows concern for the possible consequences of its transformation, feels responsible for the decisions that he makes. This is the key conclusion of these studies [10, p. 49]. Therefore, it focuses on the legal aspect of environmentally sound behavior and value-oriented knowledge as important components in the system of environmental training for children and adolescents.

In general, the global and European dimensions of environmental education for sustainable development are quite representative. Let's mention, for example, the environmental educational guide “The Handbook 01 Environmental Education” (PalmerJoy & NealPhilip, 1994), which is to be taken as an environmental educational textbook that provides the reader with clear guidelines for environmental conservation, development, implementation and evaluation of cross-curricular programs operating in the UK. Authors Joy Palmer (Senior Lecturer in Education at Durham University and Former Chairman of the National Association for Environmental Education (UK)) and Philip Neal (Former Secondary School Principal and current Secretary General of the National Association for Environmental Education (UK)) offer analysis of global crises, international environmental education, policy emphasize that environmental education is a process that is interdisciplinary and lifelong in nature and application; consider environmental education holistically, which includes social, political, economic, technological, moral, aesthetic and spiritual aspects, emphasize the value approach to solving environmental problems in educational institutions. This is a step-by-step practical guide, an effective resource that helps educators create an effective environmental educational program for their schools, answering the question “What is environmental education and how to implement it?” [11].

The reference document “Environmental education and training in Europe.

Background paper for the European Union Conference EE&T in Europe” has not lost its conceptual significance. It outlines the European environmental education vectors that Ukraine is focusing on today. It should be noted that the research of Gratiela Dana Boca and Sinan Sara”Environmental Education and Student's Perception, for Sustainability” [12] is rather interesting in the context of our problem; it characterizes environmental education and expresses its role for sustainable environmental development. On the example of the Northern Center of the University of Baia Mare (Romania), which surveyed 358 students, studied the state of environmental education, its relationship with sustainable development, the students' perception of ecology among future engineers, mechanics and economists, their relationship to sustainable development, etc., analyzes measures to protect the environment, which involve students. It should be noted that Ukrainian scientists have not conducted a similar study.

At the initial stage (theoretical and diagnostic) of the experimental study, we made the following scientific steps. It was analyzed the source base on the problem of research, current normative international environmental documents, national legislative framework on the greening of education, teaching and methodological support of this process in higher educational institutions, environmental component in the content and structure of the higher schools. It was defined the level of knowledge of environmental knowledge, the level of formed environmental protection skills to the environmental activities, the willingness of future professionals to carry out environmental activities under conditions of sustainable development by questioning the students at the higher school.

The obtained results served as a material for the development of methodological recommendations for the formation of environmental knowledge, skills and abilities of future specialists, which consisted of special measures aimed at creating an environmentally rich educational environment. It provided optimal conditions for greening education (search-theoretical stage). Let's consider the individual results of our study in details.

It should be noted that in our study we will be talking about specialists with non-specialized higher environmental education, since under the present conditions (declaring Ukraine's course for integration into the European community), sustainable development implies, in particular, the development of higher education based on a comprehensive, technology-based higher education, economic, legal and socio-cultural approaches. Greening should cover all levels of training, taking into account the needs of the individual, region and state. Therefore, in the curricula of non-professional higher schools (which do not train environmental specialists) at the bachelor level, according to the Environmental Education Concept [3], there should be an ecology course that includes the necessary theoretical and practical aspects, as well as corresponding to each individual university course from the block of applied environmental disciplines. For this purpose, one of the obligatory courses "Fundamentals of ecology" (basic ecological knowledge) and courses of the block "Applied ecology" (depending on the profile of the university i.e. "Agroecology", "Urboecology", "Landscape ecology", "Military ecology", "Geoecology", "Environmental problems of energy", "Environmental problems of transport", "Ecological law", "Economics of nature management", etc.).

Although ecological education is of particular importance for students of pedagogical higher schools and it is supposed that future teachers must master the methodology of ecological educational work along with the general high level of ecological culture, as it is shown by the results of analysis of educational and methodological support of educational process of several universities, greening education has not got a sufficient basis for implementation nowadays: in bachelor's degrees, the basics of ecology is optional everywhere. Nowadays, for example, at the National Pedagogical Universities, the course of choosing "Elements of Ecology" is provided by the greening of teacher educa-

tion. The future teachers' environmental culture is being taught with some other disciplines through cross-curricular communication. For instance, in the course of Natural Science for this purpose, the topic "Ecological education of elementary school students at the lessons of Science" (2 hours of lectures, 2 hours of practical classes). In the course of studying pedagogy students' methods and forms of younger student ecological education are introduced to the content. The discipline "Methods of educational work" provides curriculum time to familiarize students with the content, directions, forms of environmental education in extracurricular work.

However, this is not enough. We can say that the process of greening higher education does not meet the requirements set by the international community and the above-mentioned Ukrainian documents: analysis of current educational courses gives grounds to say that the curricula do not thoroughly and comprehensively address the problems of sustainable development, environmental problems in the region, where the students live or study, and similar global environmental problems, ways to solve them.

By the way, the same situation can be observed at the level of school environmental education. Thus, the announced inclusion in the invariant part of the school component of the third stage of the course "Fundamentals of Environmental Knowledge" [3] is often now only a written declaration as nearly since 2008 or 2010 this subject is optional. Besides, the schools choose such subjects as Christian Ethics, Logic, Choreography and so on. Certainly, the educational and professional programs of the bachelor and master preparation in the sphere of Ecology provide a wide range of professionally oriented disciplines, for instance, General Ecology, Plant Ecology, Animal Ecology, Human Ecology, Landscape Ecology, Environmental Monitoring, Applied Ecology, Environmental Audit, Environmental Management, Environmental Security Management, Fundamentals of Sustainable Development, Environmental Policy, Environmental Economics and Environmental Activities, Anthropogenic Rationing Modern Environmental problems, Ecological economy, etc.

Thus, the analysis of educational and methodological support for the process of greening education for sustainable development in the environmental protection of non-environmental profile showed that the range of educational disciplines is insufficient ("Fundamentals of Ecology" is not the only optional course for students; the cross-curricular nature of environmental knowledge is taken into account (separate problems are considered in particular the course of study of pedagogical disciplines), under such conditions, the acquisition of environmental knowledge with a projection for sustainable development is insufficient. In the course subjects Fundamentals of Ecology / Elements of Ecology) it is fragmentary and episodic, mainly at the level of generalizations about natural complexes of different rank, emotional and value expression of judgments about the need for their protection [13-18]. Thus, there are reasons to say that the higher education

Table I. Participants of the experimental study

The name of the specialty	Number of respondents at 1-5 courses of the State Higher Educational Institution "Vasyl Stefanyk Precarpathian National University"					Total number of respondents
	1stcourse	2nd course	3d course	4th course	5th course	
Engineering	28	3	0	20	5	50
Biologiy	3	3	10	22	12	50
Pedagogy	2	26	0	16	6	50
Total	33	32	10	58	23	150

system needs further serious greening-improvement in the direction of formation of ecologically competent person who has the proper environmental knowledge about sustainable development, problems of conservation of the planet / state / region, personal conservation, has the skills of environmental behavior in nature [19].

We came to this conclusion by analyzing the problem of the higher education greening in practice, based on the observation of the educational process, and the results of surveys, questionnaires of students and teachers.

To determine the basic levels of student environmental knowledge formation among young people of certain specialties at the Vasyl Stefanyk Precarpathian National University, the following evaluation criteria were developed: knowledge about sustainable development, global environmental problems; professional knowledge of students in natural sciences, botany, pedagogy, teaching methods of science; attitude of students to ecological situation, problems of nature management, nature conservation; environmental consciousness; students' motivation for environmental conservation; environmental protection activities, etc.

Future experts were interviewed to evaluate their environmental and professional orientation and level of environmental knowledge. The questionnaire was aimed at clarifying the following problems: determining the level of environmental knowledge of future specialists for sustainable development; attitude of students to environmental problems; determination of the level of ecological consciousness, environmental activity of students. The questionnaire was created on the Google Forms online resource and was used both online and in the standard standard face-up form in the test form filling at the classrooms. The respondents were students receiving engineering, biological and pedagogical education. The age of the participants in the experimental study reached 18-22 years. The ratio of men and women at this stage of the experiment varied within the following limits: 34.66% of male and 65.34% of female (150 persons in total). General characteristics of the sample of students are presented in Table I.

At the beginning of the experiment 150 questionnaires were issued; the purpose of the questionnaire was to determine the level of student ecological culture. The most active students were fourth-year students (Table 1). For various reasons, third-year students of engineering and pedagogical specialties abstained from voting. Therefore,

biology students have been taken into account because of their sufficient theoretical level and the highest aspiration and goal setting for self-development and self-improvement. It should be noted that students with a pedagogical education showed higher results in answering questions of a general cultural nature. In turn, engineering students showed the lowest results and the least interest in this survey. About 31.33% of students did not want to indicate their identity. In the personal data column, they only identified themselves as "anonymous".

Let us analyze the data of the fourth-year students' questionnaires, since they were the most active in the study and in general almost the same number of students participated in the survey (20 future engineers; 20 future biologists; 16 future teachers).

Here are some specific questions.

Having asked "What is the place of environmental knowledge in your profession?" we obtained the following results: 94% of future engineers, 100% of future biologists, 100% of future teachers classify them as an important and necessary component of the profession. This indicates that the respondents are aware of the importance of mastering knowledge about nature conservation. However, there is no understanding of the nature of the environmental conservation problem under conditions of sustainable development. This is evidenced by the answers to the following two questions. First of all, the question "What do you mean by" sustainable development"? as it should be noted that only 10% of the students of the Faculty of Education gave definitions of the term "Sustainable development" (typical answers - "stable balanced development", "development that meets the needs of the present time, but brings the danger to the ability of people in the future to meet their own needs", 37% of respondents associate this concept with economic development, 43% answered that they do not know what it is about. It is interesting to note that the students of the Pedagogical Faculty formulated the concept of environmental activity in the conditions of sustainable development as the environmental protection, care and conservation, in determining the directions of environmental activity of human beings, only 10% of future teachers identified protection against negative impacts of humans, most instead called environmental protection activities called flora and fauna protection. Thus, future experts identify the ecological activities of a human in terms of sustainable development with the protection of

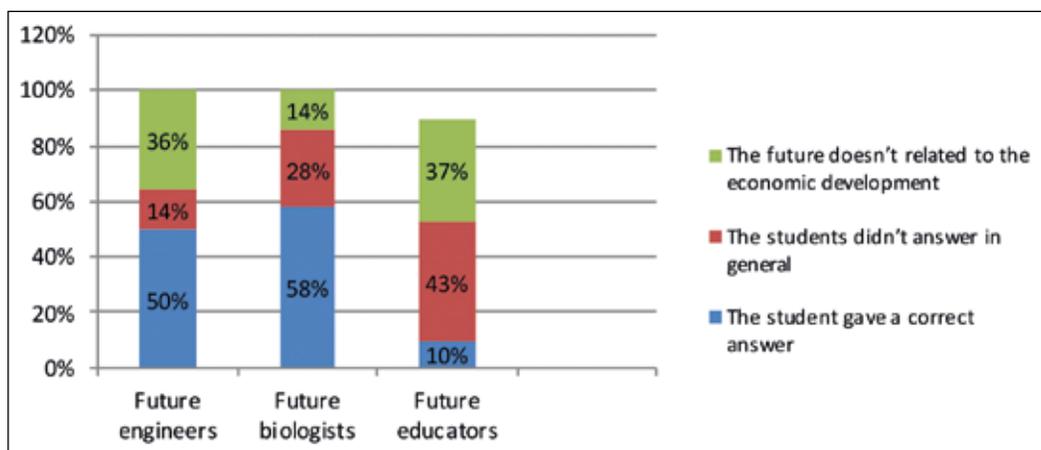


Fig. 1. The results of the answers to the question “What do you mean by sustainable development?”

flora and fauna, they have formed a somewhat one-sided understanding of nature protection as protection and conservation of wildlife.

The students of the Faculty of Natural Sciences showed a greater awareness of the problems of environmental management for sustainable development: 58% identified the main directions of sustainable development in the field of environmental management and conservation; 14% connected environmental development to sustainable economic development; 10% were not aware of this problem; 18% said they did not know what they were talking about.

The answers of future engineers were as follows: 50% answered about sustainable development problems; 36% embodied sustainable development with economic growth; 14% could not answer. Thus, future experts are not sufficiently informed about the content of the concept of “sustainable development”, problems of environmental management, sustainable development is usually identified with stable economic growth (Fig. 1).

We found out the respondents’ level of knowledge about international environmental activities. Respondents’ answers to the question «What are your famous organizations, structures, institutions involved in environmental activities? a) in their local region; b) in Ukraine; c) in the world» showed that, on the one hand, almost all students are aware of the global level of environmental protection (for example, most questionnaires make a sure mention of UNESCO, UNEP, WHO, IUCN as international environmental organizations. On the other hand, at the level of Ukraine, with the exception of the corresponding ministries (76%), students could not name such institutions, 24% supposed “Green party” to be environmental institution. A similar situation is in giving similar examples at the level of their region. So, it turned out, students’ level of knowledge and interest in global environmental manifestations are higher than at regional and national levels.

One of the questions of the survey was aimed at revealing knowledge about the environmental activities of the students themselves. We offered the students the following situation: “After your picnic in the forest, there is a lot of litter (bottles, food waste, household waste (paper), plastic utensils and plastic bags. What would do you do with the garbage?” 10% said they would burn paper, 46% said that

they would bury food waste, 84% said that garbage should be taken away, not left in the forest, and then thrown away at home. We emphasize that none of the students indicated that they would burn plastic utensils. However, while respondents are generally aware of the inadmissibility of leaving garbage in the forest and the harmfulness of burning (except for those who are willing to burn paper), they are prepared to take the garbage home, but they did not indicate environmental practices that are consistent with the principles of sustainable behavior in the environment (refusing plastic utensils and polyethylene in general, sorting garbage, etc.).

To summarize, let us note that the greening of higher education is insufficient (this process is not supported by the relevant disciplines). The future specialists will master the environmental knowledge on the global level and at the level of operation of the conceptual apparatus, they are best acquainted with the problems of environmental protection in the conditions of sustainable development students of the Faculty of Natural Sciences. The future teachers practically don’t know the problems of sustainable development, they do not distinguish between bioecological and environmental knowledge, insufficiently aware of modern environmental education. In general, respondents mistakenly represent sustainable development, not in the dimension of environmental management and conservation, but in the sphere of sustainable economic development; in higher education, insufficient attention is paid to empirical experience and theoretical generalizations, to the development of environmental knowledge skills for sustainable behavior in the environment. Unfortunately, the students do not distinguish rational use of nature as a direction of nature conservation for sustainable development.

So, despite the fact that greening is declared as one of the strategic directions of higher education, the content and structure of the environmental component is insufficiently implemented. In this situation, we believe, it seems most paradoxical to us that all 100% of students from different specialties on the question «Do you think that the periodic training and advanced training of specialists in various fields of ecology and environmental protection is necessary?» answered positively. This demonstrates the students’ interest in the issue of environmental culture among other

things and, probably, their willingness to increase their own level of environmental culture in the future.

Based on the analysis of the problem of greening education in the conditions of sustainable development in theory and practice, we distinguish a number of measures / methodological recommendations that can optimize this process at the higher educational establishments.

First of all, all components of the standards of higher education should be updated and supplemented by new requirements for the content of training, social ordering, diagnostics of the quality of environmental and creative competence of future specialists during the decade of education for sustainable development. The content of environmental education should be reflected in the National Standards of Higher Education in all areas of preparation in accordance with the provisions of this Concept. There is an urgent need to substantiate, develop and specify the content and structure of empirical and theoretical environmental knowledge and methods for their formation in higher education. The problem is also seen in the fact that the current system of environmental education in Ukraine, unfortunately, does not have the proper level of educational management. The Ukrainian higher educational system must take decisive steps towards the management of environmental education.

We consider that higher education is gradually losing its former advantages in the formal sphere through the imitation of other's educational schemes. The informal educational activities remain underdeveloped, and their importance can hardly be overestimated in the successful achievement of educational goals for a balanced information society. The latest telecommunication technologies have not yet been widely implemented in the educational processes of most higher educational institutions of the state, which calls into question the practical implementation of the basic provisions of the Agenda for the 21st Century [2]. In addition, in the public consciousness, the understanding of environmental education often comes down to teaching only the Natural Sciences (Biology, Geography, etc.), while forgetting the great potential of pedagogical subjects, subjects of the linguistic and literary cycle, etc., as any ecological form values, the ecoculture of the student body, it is only necessary to isolate it in the course of one or some disciplines and then use it as a didactic tool.

Therefore, in the current situation (due to a number of reasons related to the reduction of training load, saving material resources, reducing the amount of training load, etc.) in the Ukrainian realities of the higher educational establishments it is advisable to ask the question not about the expansion of environmental education, but rather about its renewal, innovation content and forms, its new status and importance in the context of building an education system for sustainable (balanced) development of Ukrainian society.

Thus, natural resources, inherited by the current generation of Ukrainians from thousands of previous generations, are testimonies to the high level of their ecological consciousness, where the knowledge of nature as a gift of God

was passed from the generation to generation, so it should be appreciated and preserved. That is why the folk-pedagogical knowledge of Ukrainians in the field of nature conservation should be updated and used creatively in higher education. So, on the one hand, there is a great historical and pedagogical potential of Ukrainian folk pedagogy and academic pedagogy, on the other hand, it is not fully used and actualized (works of S. Rusova, V. Sukhomlynsky, and other educators, the experience of the Ukrainian school of the early twentieth century, the heritage of teachers of the Soviet era, the practice of environmental education in the second half of the twentieth century, etc.).

We believe that the analysis of pedagogical experience of Ukraine in the field of environmental education, as well as a comprehensive assessment of national environmental potential will make an important step towards the implementation of a balanced international policy of ecological and economic progress. In this regard, it is advisable not only to solve environmental problems in the Ukrainian dimension, but also to offer the international community educational achievements in shaping the environmental consciousness of the individual, the Ukrainian experience in solving global and regional environmental problems.

Nowadays, humanity has entered the stage of continuous environmental education, lifelong environmental education, and the problem of formal and non-formal education is becoming more relevant, in particular the issue of adult environmental education in Ukraine is in its infancy. Without obtaining the proper environmental knowledge of all citizens, it is problematic to talk about conditions for sustainable development. Moreover, international documents focus on global environmental problems, sustainable development, and in Ukraine sustainable development problems are often interpreted in a distorted light, linked to economic development, which, among other things, is caused by environmental ignorance, lack of knowledge about the international context of education greening. Making environmental knowledge accessible to everyone is one of the goals of greening education in Ukraine.

In this context, close cooperation between teachers, families, community activists, professional organizations and the church is rather important in the field of greening and ecology. In other words, it's about creating a so-called environmentally saturated environment, which we consider as one of the effective conditions and a factor of sustainable development. The heritage of the Ukrainian system of ecological education is the emphasis on the formation of ecological morality, ethics, culture, actualization of ethno-pedagogical knowledge of Ukrainian, formation of environmental consciousness by means of oral folk art, cultural and artistic means, Ukrainian song and more. This factor can become fundamental in building a model of formation of a personal ecological culture under the conditions of the higher educational establishments.

We consider education not only as a priority area of state economic development, but as a condition for ensuring its sustainable development through the introduction of a competent paradigm of learning (to replace the cog-

nitive-oriented) and focusing the content of education on the principles of environmentally sound, balanced development.

In our opinion, the legal aspect of shaping environmentally sound youth behavior should be important. The legal aspect is, first of all, that a person must be aware of his or her responsibility to the law for the destruction of nature, the harming of the environment, and unconditionally respect environmental laws. In our view, this aspect has not been sufficiently developed in theory or in practical terms in the context of greening education for sustainable development.

CONCLUSIONS

The content of environmental education of future specialists should provide theoretical training i.e. appropriate amount of environmental knowledge, proper management for sustainable development, knowledge of regulatory support of the process of greening education, information on international environmental documents, focused on sustainable development, orientation of the student; and practical training i.e. development of the necessary volume of practical ecological knowledge in the field of environmental protection and rational use of nature, ability to analyze and model environmental situations with an orientation to their management independently; developing an awareness of the reality of the environmental crisis and ways to prevent it; acquisition of environmental skills, ability to assess environmental situations and carry out environmental protection measures in the native region, to form an active public position to address environmental issues and preserve the biosphere, to be able to use modern information technologies actively to solve environmental problems (see Fig.2). Considerable importance is the actualization of environmental problems in the topic of diploma (qualification) works (projects) of graduates at pedagogical, natural, technical, agrarian, military and other areas of preparation, involvement of students in the implementation of research works on environmental topics, to participate in environmental trainings, competitions and conferences, introduction of laboratory and practical classes in ecology, field and industrial ecological practices into the educational process of educational institutions. The subjects of course and qualification works (projects) should be formed, first of all, taking into account the real needs of the region and the state for environmental protection and rational use of nature in the conditions of sustainable development.

Increasing the level of greening of education will be facilitated by the participation of specialists from different directions of educational training in the development of State standards for environmental education; liaison with NGOs; involvement of students in the implementation of joint environmental projects, research programs and the publication of textbooks and manuals; training and retraining of pedagogical staff of higher education institutions in the field of environmental education.

As there is no separate subject on ecology and rational environmental management in the higher school of Ukraine today, the problem of student environmental knowledge formation needs to be solved on a cross-curricular basis, with the main didactic task which has to be solved by teachers of pedagogical, natural science, and literary cycles. The ways to increase environmental education within the higher educational establishments are to increase the weight of environmental issues, both within specific subjects and through the establishment of internal and cross-curricular links; creation in educational establishments of appropriate educational and material base: corners of nature protection and pets' corners at schools, etc.; improvement of forms and methods of environmental education, active involvement of the student in environmental work; the formation of motives for a responsible attitude to nature, the desire to know it more deeply, to multiply its riches. To do this, it is necessary to develop pedagogical conditions for cooperation between students and teachers in the context of environmental education. The leading methodological principles are the principles of environmental imperative (environmental responsibility of the individual), scientific-theoretical (ecological way of thinking), humanitarian (ecological culture), economic and legal (ecological reasonableness, ecological expediency, leading principle methodological principles of introduction of ecological education and upbringing at the higher schools; applied (environmental safety) and pedagogical (environmental education). In other words, environmental knowledge is an important basis for shaping the environmental culture of future professionals.

It is advisable to implement the greening of the higher educational system through a holistic educational system of formal and non-formal education on the basis of a cross-curricular ecological-educational model, creation of an ecologically saturated environment on an activity basis. An important condition for the effectiveness of this process is the introduction of innovative teaching methods, project technologies, game techniques, field trips to nature protection objects, the very environmental activities of students, etc., which are designed to develop cognitive interest of future professionals in environmental issues, environmental activities.

Emphasizing on the cross-curricular nature of environmental knowledge, we have developed a methodology for their formation in the process of educational and extra-curricular activities on the basis of a competent approach with a focus on sustainable development. This methodological system has three main components: the target, the cognitive, and the behavioral components. Unlike the traditional approach (the purpose of education is to master the knowledge system), under a competent approach, not only is the mastery of relevant environmental knowledge, but students acquire knowledge about nature conservation in the context of sustainable development, they acquire the ability to solve environmental problems on the basis of the acquired knowledge. Therefore, we do not diminish the value of knowledge, but emphasize the priority to apply and use it.

acquisition of environmental knowledge in the context of sustainable development				
1. target				
gaining experience of environmental activities during studying at the higher school			formation of sustainable ecological values	
knowledge of sustainable development	knowledge of environmental activities of Ukraine, the region	knowledge of nature conservation in the dimension of law	study of special ecologically oriented disciplines	
knowledge of international documents on environmental protection for sustainable development; the legal framework of Ukraine in the fields of nature protection and environmental education		2. cognitive	updating of ecological component during the study of professional, pedagogical and other disciplines	
			knowledge of the biosphere	
knowledge of environmental problems of the world, Ukraine, Carpathian region	folk pedagogical knowledge of Ukrainians on nature conservation and protection	domestic pedagogical experience of the past in the field of nature protection	writing scientific papers (bachelor's, master's) on environmental topics	
participation of students in extracurricular activities for nature protection	participation in international, Ukrainian and regional environmental actions	excursion activity to the objects of nature reserve fund of Ukraine, a region	promotion the ideas of the Sustainable Development Movement among students, schoolchildren, locals	
organization of ecologically saturated environment at the higher schools (promotion of the idea of sorting garbage, arrangement of garbage containers for plastic, paper, glass, creation of nature corners, aestheticization of the environment, promotion of healthy lifestyle, creation of the Society of Public Ecologists, systematic participation in ecotours, seasonal actions "No to cutting down the Christmas tree!", charity events		3. behavioral and activity	folk pedagogical knowledge, academic disciplines, interecologization of pedagogical disciplines, disciplines of language and literature cycle, professional disciplines, elective courses, "Environmental activities for sustainable development"	
			carrying out of work on formation of nature protection behavior of schoolchildren (creation of school for young ecologists, activity of Eco-school, involvement of schoolchildren in carrying out joint ecological actions	
cooperation with public organizations, the church, Caritas, government agencies on environmental protection	actualization of the environmental component in pedagogical, industrial, field and other types of practices	independent work, extracurricular work	research work, project activity	conducting environmental education for adults

Fig. 2. Components of the process of formation of environmental knowledge of future specialists on the basis of a competent approach

The objective will be to develop the ability of future professionals to address environmental issues through nature conservation based on environmental information for sustainable development, and to gain real environmental experience while studying at university. The cognitive (perceptive) component involves the students' educational and cognitive activity aimed at assimilation of environmental

knowledge in the context of sustainable development, information on environmental problems of the world, Ukraine, its region, etc. It is carried out in the course of studying relevant disciplines, as well as on a cross-curricular basis. The behavioral and activity component involves students' participation in nature conservation activities, their involvement in university, city, state, international

environmental actions, the ability to organize environmental activities with schoolchildren, the organization of environmental education for adults, and others.

In further studies, we will analyze the results of the implementation of our methodology in the educational process of the higher educational establishments, which we have been conducting since 2017 at Vasyl Stefanyk Precarpathian National University.

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ORCID and contributionship:

Halyna V. Bilavych: 0000-0002-1555-0932 ^{A, D, F}
 Uliana S. Borys: 0000-0002-2670-8061 ^{C, D}
 Oleg Ja. Dovgij: 0000-0002-9718-3442 ^{C, D}
 Andrii B. Savchuk: 0000-0001-5280-3647 ^{B, F}
 Nadiya O. Fedchyshyn: 0000-0002-0909-4424 ^{B, F}
 Larysa Ya. Fedoniuk: 0000-0003-4910-6888 ^{D, E}
 Borys P. Savchuk: 0000-0003-2256-0845 ^{C, E}

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CORRESPONDING AUTHOR

Larysa Ya. Fedonyuk

I. Horbachevsky Ternopil National Medical University
 Maidan Voli, 1, 46001, Ternopil, Ukraine
 tel: +380977008085
 e-mail: fedonyuklj@tdmu.edu.ua

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A – Work concept and design, **B** – Data collection and analysis, **C** – Responsibility for statistical analysis, **D** – Writing the article, **E** – Critical review, **F** – Final approval of the article