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**ACTUALIZATION OF THE ENVIRONMENTAL DEONTOLOGY  
POTENTIAL IN SCIENCE EDUCATION OF HUMANITARIAN STUDENTS**

*SUMMARY. Science education is a significant factor in the formation of ecological-legal competence of graduates. It is becoming an integral component of the personality lifestyle in the changing conditions of the transition to sustainable development. Reduction in the level of training in science education of humanitarian students of universities is noted in the article.*

*The author believes that the use of specially developed methodological tools concerning the content of education may be one of the ways to solve the problem. These tools are aimed at actualization of the ecological deontology potential. The proposed system includes a set of elective integrated courses and interdisciplinary modules implementing cognitive, educational and developmental opportunities of environmental deontology. Experimental verification of the system showed its role in the educational process, because it enriches the content of natural scientific, ecological, general and professional education of graduates. It also expands their socio-cultural space and contributes to the level of students' ecological-legal competence.*

*KEY WORDS. Actualization, science education, potential, the system of methodological tools, environmental deontology, ecological-legal competence, ecological life style.*

While the civilization is coming to the sustainable development, one of the prior educational tasks is the formation of a new generation of citizens who prefer an environmentally friendly life style. Life style is a set of the individual personal qualities, characteristics of everyday behavior and activities which cover all the areas of human life and are discovered in the motives and the content of the made decisions and the ways of their implementation [1; 121]. Ecological-legal competence (ELC) comprises its integral part; and it is also an attribute to the culture of a person living in the era of sustainable development. So, ELC is the main tool of regulating person's behaviour and activities in the environment. Its main components are ecological competence, ecocentric outlook and global thinking; environmentally approved activity and ethical-legal standards in its organization management; axiological attitude to the surrounding world, "healthy" pragmatism, necessity, responsibility, economy and thrift, ecological activity.

The graduates of educational institutions should be not just ready for such a life style, but follow it today, designing their life strategies, plans, programs, personal life and future professional activity in accord with it. However, the public opinion polls carried out among the graduates of the general and professional education institutions during the last decade show that a certain part of youth is inclined for technocratic values and economic benefits which sometimes are harmful for ecological expediency. Cultural and axiological guidelines become deformed and ecological deviance level increases.

It is connected with a number of reasons:

1. By the late nineties in our country and in the rest of the world the environmental education, which was supposed to improve the level of the public environmental culture, faced a recession. Nowadays a new model is proposed instead – «the education for sustainable development» [2]. However, its practical implementation meets certain challenges [3] due to the lack of the methodological support.

2. The environmental slant of education reduced. The balance between the natural science and social-humanitarian components in general education has been broken now, due to the significant decrease of natural science classes in the curriculum.

3. Education specialization has both advantages and disadvantages. The curricula developers strive to exclude minor, nonspecialized subjects, to minimize a set of integrated elective supporting courses and optional classes. However, these very classes and courses prevent graduates from limited narrow-subject training, expand their educational space and their worldview; they supplement the major subjects in ecocentric worldview forming, which is one of the basic life style components today.

The graduates of the Humanities departments – sociologists, economists, teachers, social workers, librarians and other specialists who are to perform the key social and educational functions in the society – are particularly vulnerable. The list of competences they are supposed to have according to the Federal State Educational Standards does not include an environmental (and ecological-legal) competence. The current situation with the natural sciences education of the humanitarian students is unfavorable as well. Certain natural science courses were either excluded from the basic part of the curriculum of many departments or transferred into the variational part with a number of classes being twice or more cut. Besides, the general natural science knowledge of the entrants of the humanities departments of the universities leaves much to be desired.

The situation can be improved by a more efficient usage of interdisciplinary resources, variational component of the graduates' training, environmental deontology potential (*capabilities and means*) actualization (*purposeful detection, enrichment, development and implementation*) in the content of education.

The term «deontology» (*Gr. deontos due, proper + logos doctrine*) was coined in the first half of the XIX century by an English lawyer I. Bentham. He considered deontology to be the doctrine of the moral issues and morality, of the proper professional legal activities [4]. Today its principles are applied to practically all existing activities. It is subdivided into pedagogical, medical, psychological, legal and environmental deontology.

Environmental deontology is a new integrative scientific branch. It joins the knowledge of socially significant and environmentally approved ways of regulating the relations of man, society and nature, and the means of their implementation in the civilizational practice.

Natural and technical sciences comprise its most important theoretical foundation. This is, first of all, the knowledge about the natural bio-geo-chemical cycles and the laws of ecosystems functioning, the data about the methods of their modeling and forecasting their development under the influence of human activities, the calculations of the production field environmental impact. Another pillar of the environmental deontology is social and humanitarian sciences, the knowledge about the laws of human existence, regularities of human behavior and activity, underlying the environmental traditions, culture, ethics and law [5].

The concepts of modern natural science, the study of the biosphere, ideas of the noosphere formation and sustainable development, notions about the ecological imperative as a system of scientifically proved norms and rules, regulations and prohibitions of a person's activity and behavior, the main principles of social sciences, ethics and law prescribing the public regulation of conduct and human activities comprise the methodological basis of ecological deontology. It consists of several structural elements. Their research programs are meant to study two interrelated forms of the regulatives in the «man – society – nature» system; these forms are environmental law and environmental ethics. [6].

The interdisciplinary nature of environmental deontology, its diversity, multiperspectivity, ethical and legal orientation and powerful scientific component determine the significance of its potential in sustainable development management. Recognition of education as a key factor in civilization processes requires to consider its educational potential and opportunities of its implementation in the educational process, in order to improve the learners' environmental-legal competence.

In psychological-pedagogical studies [7] «pedagogical potential» is considered to be an integrated dynamic structure that unites:

- personal potential as a set of internal capabilities of a student determining, his/her motivation;
- educational environment potential as a set of external conditions and factors stimulating the development of a personal potential.

According to such an approach, pedagogical potential of environmental deontology is a number of educational, didactic and developing resources and opportunities incorporated in its information field that can be implemented in the educational content and aimed at increasing the level of environmental-legal competence of all the participants of the educational process.

It consists of:

- *Cognitive component*. Due to the objective focus of the environmental deontology pedagogical potential, the content of education should include a system of environmental and legal knowledge; ideas of the environmental imperative, of the universal values of human life contributing to the formation of ecological consciousness,

ecocentric outlook, global thinking, skills and abilities to cope with environmental challenges with the help of the legal tools.

The holistic worldview, integrating scientific, social- humanitarian, cultural and technical-technological elements, functions as a system-forming factor here. It highlights the role and place of a human and his activities in the biosphere of the Earth, and it should contribute to the understanding of ties between people, their culture and nature, human's role in providing sustainable development of the society; to the understanding of the objective necessity for the society to move to this model, its ideas and ideals.

— *Educational component.* This component is closely connected with the cognitive one. It is implemented through the curriculum activities and various organization forms of the extracurricular work, and is aimed at the development of learners' personal qualities inherent in the environmentally friendly life style.

— *Developing component.* It is expressed in the integrated influence of the cognitive and educational components on the development of cognitive, axiological-motivational, emotional-sensual, volitional, psycho-physiological and operational areas of a personality and their harmonization.

Due to the analysis of the humanitarian syllabuses, educational and methodological support of the studied subjects and pedagogical potential of environmental deontology, we developed a system of methodological tools extending the capacities of the natural-science disciplines for encouraging students' ecological life style and their ecological-legal competence.

The key idea of its modeling is a «harmonic integration» of multiple-subject knowledge, technologies and forms of educational process organization, training and upbringing realized through the mutual supplementation, productive dominant transformation, mediation, dialogue of cultures [8; 51]. So, natural-scientific, cultural, pedagogical and integrative potentials of environmental deontology can be completely implemented; and the principle of cognition-experience-action unity is realized as the fundamental one in the environmental-legal competence formation.

The core of the system is comprised of the elective integrated courses and interdisciplinary modules. Their content was designed according to the informational-educational, ideological, cultural, developing, educational, integrative functions of environmental deontology in the educational process and the role of ecological-legal competence in the social practice. This defined the criteria for the educational material selection and required the following issues to be included in the content of the courses and modules:

- ecocentric worldview;
- social eco-systems and their components;
- interconnection between nature and society;
- environmentally friendly organization of life activity and spending natural resources within the biosphere capacities;
- ecological imperative and its implementation in the framework of norms and requirements of the environmental legislation;

— sustainable development, the role of natural and technical sciences in its maintenance;

— axiological attitude to the surrounding world, civic consciousness, responsibility and human rights.

General laws, learning patterns and principles discovered by the classical pedagogical science [9], cultural, competence-based, social-personal, operational, integrative, axiological and other approaches underlie the original theoretical and methodological foundation of the contents of these courses.

This theoretical basis was applied to develop the following elective courses: «Ecological Culture Studies», «Social Ecology», «Cognitive Models of Modern Science in Humanitarian Researches» and their separate blocks («Environmental Worldview», «Social-eco-systems and Management Tools of Their Development» and others). These courses were used by the departments of the Tyumen State University and Tyumen State Oil and Gas University. As a rule, big topics of the social-humanitarian and natural-scientific disciplines were concluded by studying summative interdisciplinary modules.

For example, the modules «Crossroads of Physics, Chemistry and Biology in Social Ecology» and «Ecological Culture Studies as a Synthesis of Natural, Technical and Social-humanitarian Sciences» were conclusive in the formation of the holistic worldview and ecocentric outlook in the process of the elective courses' study. The module «Environmental Worldview and New Models of Civilization Development» revealed humanitarian problems of the relationships between the society and nature, issues of their ethical-legal regulation, the role of culture and education, natural and technical sciences in the sustainable development. It concluded the study of the courses «Concepts of Modern Natural Science» and «Modern Scientific Worldview».

Modeling of courses and modules content is based on the integration of natural-scientific, social-humanitarian and professional knowledge. This integration is founded on the idea of merging of various cognitive forms. It was implemented through the convergence of different-subject knowledge, their imposition and mutual enrichment in order to consider phenomena or processes from different positions, to analyze them and subsequently synthesize to build a complete picture. While working, the following key concepts were used: system, process, self-organization, evolution, management (regulation). The ideas of system organization for social-natural environment, its development under the influence of objective and subjective factors, management principles of the scientific regulation of relationships of man, society and nature became the system-forming core of the content.

So, in the course «Ecological Culture Studies», while studying the processes of social - and cultural genesis, we turn to the development history of natural science, analyze its impact on the social evolution, identify its positive and negative effects on the biosphere of the Earth, human health and life. Thus, students better understand the sources and causes of the current crisis of the mankind, and the need to change human activities and social paradigm from technocratic development to eco-

humanitarian. So, the system of natural-scientific knowledge is being enlarged and completed. On the one hand, it supports and expands the frontiers of the natural-scientific education for humanitarian students. On the other hand, we face the problem of necessity to regulate life of an individual and all the mankind applying such tools as culture, ethics and law. Considering the topic «Social-eco-systems and methods of their study» within the course «Social Ecology», we rely on the ideas and methods of post-non-classical science (the systems theory, the theory of self-organization and control theory), studied in the course «Concepts of Modern Natural Sciences». The theoretical models meant to study the relationships of organisms in natural ecosystems, were applied while considering the issues of competition, cooperation and collaboration in economy, politics and life of an individual and society. They were further developed and introduced in detail in the special course «Cognitive Models of Modern Science in the Humanitarian Researches» [10], aimed to form the holistic worldview and global thinking, the skills to model social-eco-systems of different organization levels, to forecast their development and to make managing decisions.

To test the developed modules and courses in the educational process, an experiment was conducted in a number of humanitarian departments (Management, Economics, Sociology). Experimental and control groups were singled out. It became possible to include the above-mentioned courses in the educational process of the experimental groups due to the syllabuses correction in the basic and variative parts of the curriculum.

To assess the impact of the introduced innovations, the system of diagnostic tasks, surveys and questionnaires was developed; they were used at the initial and final stages of the experiment. The total experimental sample included 120 people. The diagnostic tasks and questions were divided into blocks which allowed identifying the impact of cognitive, educational and developing capabilities of the integrated courses and modules on the formation of the students' ecological-legal competence and the development of their cognitive, axiological-motivational, reflective and operational areas.

Students' answers to the questions and tasks of the cognitive block had to reveal the changes in the level of their environmental and legal literacy; the axiological-motivational block demonstrated the change of their motives, attitudes and values; the reflective block identified their idea of the social portrait of an ecologically competent person; the operational block assessed their skills and abilities in applying the environmental law tools.

The analysis of the answers shows that at the final stage the students' environmental and legal literacy increases on the average by 35%. The results within other blocks of tasks also tend to improve. The number of students who claim to follow the rules of the environmental legislation increases by 40%. About 40% of the testees are willing to invest their money to save the nature or to pay extra for environmentally friendly equipment. At the beginning of the courses only 43 % of the testees considered knowledge of the environmental legislation as the main

indicator of the ecological-legal competence; by the end of the courses 56% of the participants named such knowledge, as well as observing legal environmental norms and standards in everyday life and professional activity, as the main indicator of this competence.

The answers to the questions and tasks of the reflective block connected with the students' assessment of their own ecological compatibility were especially important. By the end of the final stage of the study, self-assessment becomes even more critical in comparison with the initial stage, it is based on the implementation of the acquired knowledge. Only 35% of the testees call their attitude to the nature competent, careful and responsible; they follow the legal environmental norms, save and protect natural resources, keep healthy life style, participate in environmental activities. 45% of the testees admit that they do not always observe the norms of environmental law, but try to change. 20% of the testees do not give any definite answers.

Of course, the answers given within the reflective block cannot be equated to the level of environmental-legal literacy, because they are highly subjective. But they were confirmed by the testees' behavior in spontaneous and modeled situations; thus, the positive change in the students' mindset was proved.

The comparison of the achievements of the experimental and control groups identified a *general tendency*: the development of all the characteristics of ecological-legal competence is more dynamic if the designed system of courses and modules is applied. The students of the experimental groups master necessary ecological-legal knowledge successfully, make original decisions, research the familiar situations in detail, look for the new, analyze the known facts deeper, are good at combining and transferring knowledge from one area to another. They are distinguished by the need to fulfill creative environmentally significant tasks and projects, to search for the alternative ways to solve the problems, to apply these decisions in practice, in accord with the ethical-legal norms.

According to the expert opinions of the teachers who participated in the experiment, the didactic potential of the educational process increases, favorable conditions for the development of many qualities (such as activity, initiative, autonomy, environmental responsibility, organizational skills, leadership skills, creativity), which are extremely important in the future professional activity of the graduates, are created.

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