Overcoming risks in the formation of environmental culture of students

Olga Shefer*, *Svetlana* Kraineva, *Tatyana* Lebedeva, *Vera* Elagina, and *Elena* Erentraut

South Ural State Humanitarian Pedagogical University, 454080 Chelyabinsk, Russia

Abstract. The article presents the result of a study on overcoming risks in the formation of ecological culture among undergraduate students of a pedagogical university. Their readiness and ability to lead an ecological lifestyle and understanding of the essence of sustainable development and environmental policy of Russia, as well as their organization of their professional activities in the formation of the ecological worldview of schoolchildren. It is high-quality education and ecological consciousness that are the basis for sustainable personal and social development, which affects the formation of the ecological culture of all members of society. Therefore, ecological culture is the basis of activities to overcome complex environmental problems (both global and regional) and prevent their occurrence in the future. The study of ways and methods of overcoming risks in the formation of ecological culture is extremely important for Russia. Russia is striving to overcome the negative environmental consequences and to raise people with their professional activities who implement the ideas of sustainable development in life. One of the ways identified by the authors of the study is the organization of work of undergraduate students with online platforms: Stepik, Skillbox, GeekBrains, Coursera, Udemy. Open education is represented by electronic resources functioning at the pedagogical university that form an ecological culture. The article presents the results of a survey to identify the state of environmental culture among students of a pedagogical university and students of schools, leading to the conclusion that it is necessary to involve the ideas of "green" universities in the practice of teaching the younger generation. This will allow us to overcome risks in the formation of ecological culture in a new way in modern conditions of pedagogical universities. It will also contribute to improving the quality of life of the population in the conditions of sustainable development of society. The authors of the article associate the overcoming of most risks in the formation of environmental culture with the creation of conditions for improving the environmental training of a university student. To increase students ' motivation to study by means of solving research environmental-oriented tasks of a professionally applied orientation, the introduction of mathematical methods in solving environmental problems. Students develop mini-projects on environmental topics, prepare course and final qualifying works with environmental content, develop the content of educational practices. This allows you to simulate the professional activity of a teacher

*Corresponding author: shefer-olga@yandex.ru

on the formation of ecological culture among students of schools, the participation of students in the All-Russian ecological quest «Share with us».

1 Introduction

Globalization, the growing power of transnational corporations and the competition of economic markets, the mobility of capital and human resources, the expansion of social and environmental risks are the main challenges in the first quarter of the XXI century [1]. The increase in environmental risks by the beginning of the XXI century was associated with a systematic aggravation of environmental problems (environmental pollution, increased consumption of non-renewable resources, the formation of a planetary anthropogeocenosis, etc.), which allowed us to state not their localization, but the transition to a new stable state – the global environmental crisis. Overcoming the latter is connected with the policy in the field of socio-economic development carried out in the leading countries.

It is known that for the first time the problem of protecting the social and natural environment at the planetary level was considered by the Club of Rome in the early 70s of the twentieth century. The problems of the ecological state of the world are reflected in the works of many domestic and foreign scientists:Y. Burgess, R. Park (the beginning of the direction "social ecology" as a subject area of knowledge), W. Catton, R. Dunlap (paradigmatic understanding of the relationship between humanity and the biosphere), A. Vil, D. Huber, A. Mola, G. Spaargen ("ecological modernization" as an approach), A. T. Bolotov, N. N. Zlatovratsky, G. I. Uspensky (socio-ecological knowledge, culture of the population's attitude to nature as a methodology), V. O. Klyuchevsky, L. M. Mechnikov, N. A. Severtsev (understanding the role of nature as a social background and the potential for the formation of the Russian people and their mentality), P. A. Sorokin (justification of the triad "society-nature-values" and the study of the spiritual and value component of culture as a problem) , etc.

According to the long-term policy in the field of socio-economic development of the Russian Federation, in particular in the field of youth policy, the state pursues the goal of «creating conditions for successful socialization and effective self-realization of young people, developing the potential of young people and using it in the interests of innovative development of the country», including overcoming environmental risks [2]. Among the means to achieve this goal, we can distinguish the educational sphere: where training and education at all levels of education [3; 4; 5].

It is in the educational sphere of Russian universities that environmental programs and projects are implemented. Environmental education in the Russian Federation allows students and graduates of universities to assess the environmental risks that arise in the course of their professional activities and the negative impact of society on the environment, develop appropriate competencies and instill an environmental culture [6].

2 Materials and methods

The term "ecological culture" was defined by L. N. Kogan, a Soviet cultural critic, who noted that «it is culture that allows us to talk about sustainable development, as not about a utopia, but the real prospect of the existence of humanity on Earth» [7]. L. N. Kogan in his works draws attention to the fact that ecological culture is a new type of culture that involves the search for new, optimal ways of interaction between man and nature, without a consumer attitude to the latter.

All components of ecological culture (Fig. 1) determine the conformity of social activity and the laws of natural integrity (in particular, the correspondence of human activity and such quality of the natural environment as its Planetary habitability).

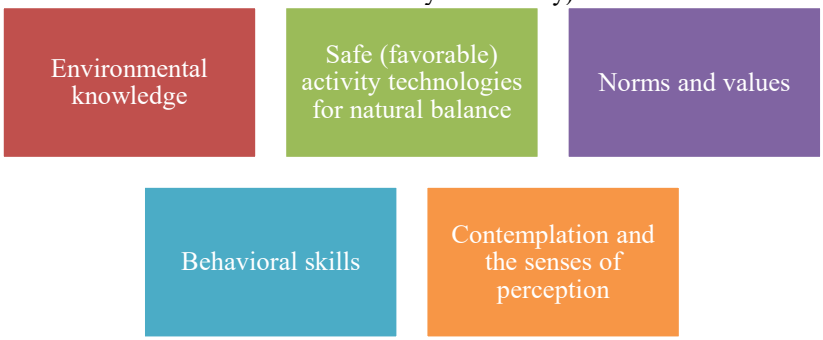


Fig. 1. Components of ecological culture

According to experts, ecological culture reproduces the review that nature is not only a source of resources, natural minerals, but also a place of our habitation and development [8; 9]. In these works, it is proved that the ecological culture of a person is fundamental for the awareness and understanding of problems. Which are caused by human interaction with the environment, that is, environmental problems, as well as in their effective solution.

The concept of ecological culture is extensive, it extends to the entire spectrum of interaction of our civilization and an individual with the environment. It also permeates the entire structure of the personality of the lman. The formation and development of ecological culture is not only the most important problem of the humanitarian sphere, but also the main factor in the development of a student's personality. What is reflected in the dissertation research (S. N. Glazachev, E. V. Girusov, S. D. Deryabo, A. P. Zakhlebny, I. D. Zverev, V. A. Ignatova, D. N. Kavtaradze, B. T. Likhachev, N. M. Mammadov, I. N. Ponomareva, V. P. Saleeva, I. T. Suravegina, G. A. Yagodin, V. A. Yasvin et al.). However, the issues related to the formation of environmental culture among the younger generation, the search for methods and forms of environmental education at the university, are still open. The correction of this situation is connected with the need to solve a number of tasks. This is ensuring the dissemination of modern environmental knowledge, instilling the need for measures to improve the state of the environment, attracting students to identify and understand the environmental problems of their region.

The result of environmental education in universities is the formation of a basic level of moral responsibility for the state of the environment in the process of economic activity. And also the development of a way of attitude to nature, manifested in certain actions of the individual [10]. Environmental education consists in the accumulation of a certain amount of knowledge about the relationship between society and nature. This is necessary for any person, no matter who he works or what he does. Environmental education is the assimilation of norms of behavior in the natural environment and the formation of a civil position and moral conviction in one's attitude to nature [11]. It is based on the principles of sustainable development and a «green» economy.

To overcome the problems in the formation of students in various areas of training internal readiness to overcome environmental hazards [12] and the need to protect the environment in the context of sustainable development and a «green» economy, the Association of Green Universities was established at Russian universities. The Association unites 117 universities across the country (http://https://greenuniversity.ru//).The Association of «green» Universities of Russia is part of the federal partner program "Green Universities of Russia", which is implemented by the All-Russian green Movement EKA and the

Foundation for Support of Youth Initiatives «ERA» (http://xn--b1afaaheyr0d3de.xn--p1ai/). "ERA" is an association of student teams, the purpose of which is the introduction of specific environmental measures and practices on the basis of universities and professional educational institutions in Russia, the exchange of experience and training in methods to reduce the «ecological footprint» of the university. The first participants of the Association were 25 student teams-winners of the All-Russian environmental quest "Share with us" (www.pco.vuzekokvest.Russian Federation), which was implemented by the ERA Foundation with the support of The Coca-Cola Foundation.

The Association of Green Universities promotes:

- Environmental education of schoolchildren and students. Most of the tasks of the All-Russian quests contain activities aimed at forming an ecological culture, a healthy lifestyle and eco-education of children, schoolchildren and students.
- Development of the environmental student movement in Russia. The Association carries out the ideas of ecological sustainable development within the framework of All-Russian quests, attracting teachers as experts and scientific supervisors. Thematic mass events, such as round tables, conferences, exhibitions, festivals, fairs and many others, help to attract students to topical environmental problems and form a team of active volunteers who want to unite, join the Association and change the ecological footprint of humanity on the planet Earth and near-Earth outer space.
- Attracting teachers to participate in the development of the environmental movement in educational institutions. The Association holds online scientific conferences dedicated to topical environmental problems and education in the context of sustainable development and the «green» economy.
- Development of international student interaction and cooperation of environmentally oriented student and youth associations. The Association is engaged in the development of international cooperation, actively participates in various international events, internships and interacts with universities in Europe and the CIS countries.

In order to interest university students in environmental conservation issues, to involve them in responsible consumption of the planet's resources, to help in the implementation of student environmental initiatives, the university teacher, according to V. A. Simonenkova, V. S. Simonenkov, S. R. Gilasieva [13], it is necessary to be competent in the field of environmental education and be able to present the necessary information to the university community qualitatively. In 2019, a project was launched for teachers and employees of higher educational institutions – the School of mentors of "green" universities. The aim of the project is to help participants gain the knowledge and competencies necessary for the implementation of environmental practices and initiatives in universities, and to share tools for productive interaction with students and exchange of experience with colleagues.

The purpose of the program «Green Universities of Russia» is the formation of ecological thinking in the university community. The program includes:

The educational part is the formation of an ecological culture and skills of an ecological life among students and employees of universities.

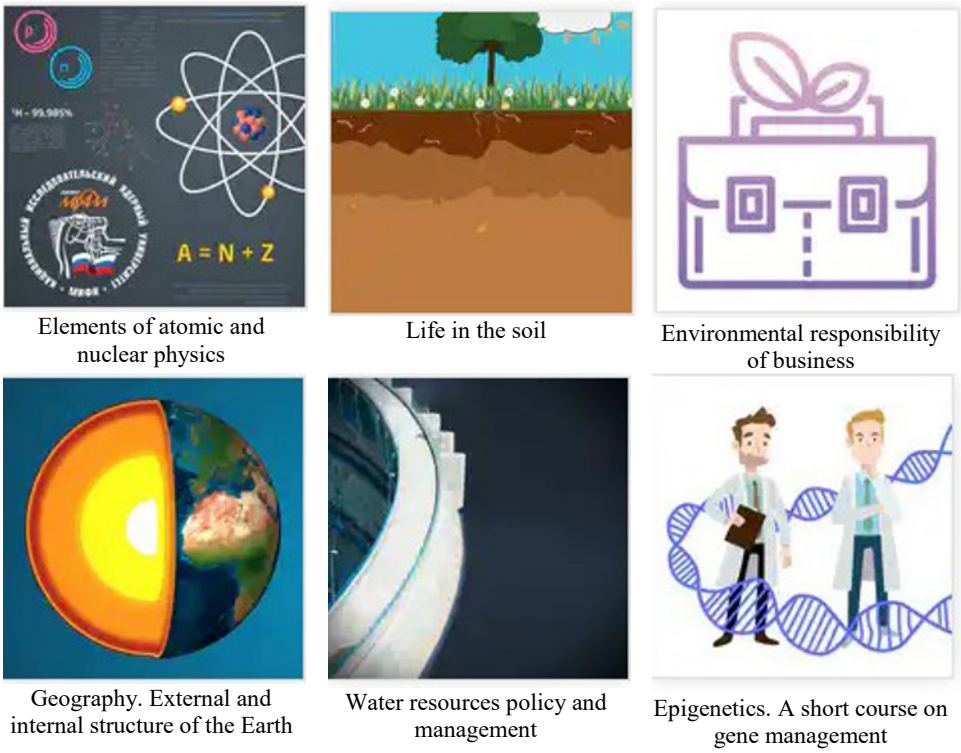
The practical part is the introduction of specific «green» practices in universities: responsible waste management, measures for water conservation and energy efficiency, landscaping, eco-transport, responsible procurement, eco-education.

The Association of «green» universities, like all educational institutions, switched to remote mode in the realities of 2020, mastered zoom and other Internet platforms, participated in a huge number of online meetings «while at home». This contributed to the integration of information technologies with other technologies, including environmental ones, in order to achieve greater efficiency and quality of professional activity, including education [14; 15].

Taking into account the requirements of the Federal Law "On Education in the Russian Federation", federal state educational standards, each educational institution must provide students with access to an electronic library system, electronic educational resources. As an electronic library system, our university uses the EBS "IPRbooks", which focuses on both fundamental and popular scientific, methodological literature on environmental education. Electronic educational resources are one of the components of the electronic information and educational environment of the university, allowing students to refer to the regulatory and legal documentation regulating the organization of the educational process of the university, data on the structural organization of the university, news, to the content of working programs of disciplines, methodological content of course courses from the personal account. Within the framework of the development of an individual educational trajectory, improving professional competencies [16; 17], distance learning organizations students can independently master the disciplines of the main professional educational program based on the use of online platforms: Stepik, Skillbox, GeekBrains, Coursera, Udemy, Open Education, etc.

The Open Education platform contains a huge number of courses and programs from the leading universities of the country (Lomonosov Moscow State University, MEPhI, Polytech, St. Petersburg State University, UrFU, NUST MISiS b, SPbSETU LETI) related to ecology: Radiation Ecology, Ecology and the environment, Human Ecology, Ecology, Basic concepts of biology and Ecology, System Dynamics of Sustainable Development (System Ecology), Introduction to Biology and Ecology, Nuclear Physics, Biophysics, Concepts of Modern natural sciences, etc.

The list of courses presented on the Coursera platform is shown in Figure 2.



Elements of atomic and nuclear physics

Life in the soil

Environmental responsibility of business

Geography. External and internal structure of the Earth

Water resources policy and management

Epigenetics. A short course on gene management

Fig. 2. The list of courses on ecology from Coursera

The analysis of courses for students that contribute to the formation of an ecological culture is presented in Table 1.

Table 1. Electronic resources forming ecological culture

Platform	Course Name	Features
Stepik	Radiation ecology	The purpose and objective of the online course is to create conditions for studying the theoretical foundations and practical applications of radiation ecology of natural and agricultural ecosystems.
	Ecology and the environment	The purpose and objective of the online course is: 1) formation of an objective understanding of the basic concepts of ecology and environmental protection problems; 2) formation of knowledge that forms the basis of autecology, demecology, synecology, about the main environmental problems in the modern world, about the structure, composition and mineral resources of the lithosphere of the planet Earth, about environmental problems of their development, about the principles of rational use and protection of natural waters, about the types of anthropogenic impact, including chemical and radiation pollution of the environment, the main pollutants and the dangers of these types of impact; 3) study of basic concepts about the ecological functions of the soil cover and the basic laws of its formation, 4) study of the basic concepts of the structure, functions and basic laws of the formation and evolution of the biosphere; 5) getting ideas about the current state of the regulatory framework in the field of environmental protection, rational use of natural resources and ensuring environmental safety, the role and tasks of environmental monitoring in ensuring a favorable human habitat and preserving the quality of the environment, about the features of the environmental situation in various regions, the main environmental problems and ways to solve them.
	Human ecology	The purpose and objective of the online course is to form an objective understanding of the basic concepts of ecology and environmental protection problems among students through the development of the discipline «Human Ecology», consisting of four modules: «Human ecology as a new interdisciplinary scientific direction», «Ecological physiology», «The influence of natural factors on the human body», «The influence of anthropogenic environmental factors on the human body».
Udemy	Introduction to the technology Blockchain	The purpose and objective of the online course is to form an objective idea of ecology in students from the point of view of the culture of energy consumption by mastering the topic «Energy consumption and ecology».
	Ten strong goals	The purpose and objective of the online course is to form students ' objective understanding of ecology from the point of view of culture in achieving the goal of ecology by mastering the topic «Ecology of the goal».

3 Results

Many scientists associate the deterioration of the environmental situation, which is especially relevant for such an industrial city as Chelyabinsk, with a low level of environmental culture of society as a whole. This is confirmed by the results of our research conducted on the basis of the South Ural State Humanitarian and Pedagogical University and educational partner

organizations of general education (table 2). 150 people took part in this study using the methods proposed by S. S. Kashlev and S. L. Glazachev [18]. 4th-year students – future teachers of physics, mathematics, computer science, primary school teachers and secondary school teachers, show a low level of environmental knowledge, insufficient understanding of existing environmental problems at the level of the city, region, region, country. Their knowledge is fragmentary and limited to the level of individual disciplines. Therefore, unfortunately, they are not motivated to environmental protection activities, because the younger generation has formed only a consumer attitude to the environment, there are no systemic mechanisms for overcoming negative impacts on environmental safety, sustainable development, which reflects negative trends in the general context of the development of society. Only a small part of the students of secondary educational institutions (30 %) understand the environmental issues of the country, region, region, city, due to participation in mandatory project activities.

Table 2. Analysis of the answers to the questions of the questionnaire «Ecological culture»

N0	Question	Survey participants	The answers, %		
			Yes	No	I find it difficult to answer
1	Are you concerned about the environmental situation in the country, the world?	students	32	29	39
		schoolchildren	41	12	47
2	Do you think about environmental problems in everyday life?	students	69	13	18
		schoolchildren	57	19	24
3	Can you influence the solution of environmental problems in your city (or locality)?	students	21	68	11
		schoolchildren			
4	Do you think it is right and necessary to involve young people in the work of cleaning up the natural environment?	students	22	57	21
		schoolchildren	33	48	19
5	Do you think it is possible to improve the environmental situation in the country through joint efforts of citizens?	students	82	17	1
		schoolchildren	86	12	2

A special feature of the study is not only the choice of one of the three answers for respondents (yes, no, I find it difficult to answer), but also the ability for respondents to provide an explanation for each question in a detailed form. The analysis of the detailed answers shows that when disclosing the second question, the respondents named such problems of environmental problems of the city (or locality): air pollution by emissions from factories, car exhaust gases (92%), water and solid waste pollution (62%). 74 % believe that organizations responsible for environmental control and protection can solve these problems, 69% – city residents, 62 % – local authorities. 1 person (a student of the school) offered his own answer (2%) - joint efforts of local authorities and organizations responsible for environmental control and protection.

When answering the question «Can you influence the solution of environmental problems in your city (or locality)?», unfortunately, many respondents lead a passive lifestyle. At the same time, 81% suggest not to litter themselves, 69% – to fight environmental pollution by enterprises, transport, 47% – to inform others (relatives, friends) about the harmfulness of urban pollution. 4% believe that it is impossible to keep the city clean, since it is a city of various enterprises (JSC «Chelyabinsk Electrometallurgical Combine», PJSC «Chelyabinsk Metallurgical Combine», JSC «Chelyabinsk Zinc Plant», JSC «Ferroalloy», LLC Chelyabinsk Paint and Varnish Plant «Fest Pro»).Thus, the respondents understand the

importance of maintaining an ecological lifestyle, which can be based regardless of the motivation-helping the environment or improving their own health.

Despite the opinions expressed on the previous question, the following results were obtained for the fourth question:

- 57% take care of plants, animals, feed birds in winter, build feeders, etc.; 26% - attend subbotniks and engage in ecological tourism;
- 8% participate in environmental movements;
- 7% organize separate garbage collection at home and hand over waste by type to reception points. At the same time, the percentage of respondents with the above answers is higher among school students than among students;
- 11% do not take any part in this.

By asking the last question, we wanted to find out measures to improve the environmental situation of our country. Thus, 82% of all students and 90% of schoolchildren are acutely concerned about global environmental problems, 18% and 10% are not concerned at all, respectively. Among the global problems known to them, the respondents identified: the quality of drinking water, deforestation, air pollution and destruction of the ozone layer, garbage accumulation, viruses and a pandemic.

The results of the survey cause concern that there is reason to think about the lack of readiness of the younger generation to take full responsibility for the environmental future of their country.

The level of development of ecological culture is becoming one of the most important indicators of the maturity and progressiveness of the social system in modern conditions [19; 20; 21].

4 Conclusion

The environmental policy in our country is reflected in the Law «On Environmental Protection» [22], which, in particular, states: «In order to improve the ecological culture of society and professional training of specialists, a system of universal, integrated and continuous environmental education and education is established, covering the entire process of preschool, school education and education, primary vocational and university education, improving their qualifications...». It was this law that became the starting point for overcoming risks in the formation of an ecological culture of students at all levels of education. Further movement in the direction of overcoming these risks is associated with federal state educational standards for all levels of general education – the mandatory implementation of a student project, the topics of which are directly related to the problems of the ecology of the native land. As evidenced by the data of our study. Fourth-year students studying at the school were not involved in mandatory project activities. And when studying subject disciplines in junior courses at the university, little attention was paid to the formation of ecological culture. This is one of the main risks for the generation of twenty-year-olds in the formation of their ecological culture.

Overcoming risks in the formation of environmental culture among future teachers of physics, mathematics, computer science, primary school teachers is achieved by using them in the educational process:

- research environmental-oriented tasks of professional and applied orientation;
- mathematical methods (processing of results, modeling) when solving environmental problems;
- mini-projects on environmental topics (development, registration and protection);
- topics with environmental content for course and final qualifying works;
- educational practices that allow simulating the professional activity of a teacher to form an ecological culture among students of schools;

–the experience of students 'participation in the All-Russian ecological quest "Share with us";

- the possibilities of electronic resources that form an ecological culture;
- opportunities of online platforms: Stepik, Skillbox, GeekBrains, Coursera, Udemy, Open education, etc.;
- ideas of sustainable development of society.

The full implementation of the above-described directions in the practice of university education increases the possibility of forming an environmentally oriented lifestyle among the younger generation, which acts as one of the components of the high quality of life of the population and as a consequence of the sustainable development of society.

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