

"Greening" Education for Sustainable Development: the Russian Federation and the Republic of Kazakhstan Case Study

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Abstract—Education for sustainable development (ESD) requires the formulation and solution of problems common to the entire world community and specific to particular countries and people. The research and use in ecologization of ethnocultural codes and other features of each country and mechanisms of international interaction play an important role in global and regional sustainable development. A union of science, education and innovation is needed, combining classical, non-classical and post-non-classical approaches in scientific research on ESD issues. The article examines the technologies of education for sustainable development in the modern world, especially the "greening" education in Russia, and the implementation of the "green economy" concept in Kazakhstan.

Keywords—sustainable development; education for sustainable development (ESD); greening education; ESD technology; conceptualization; axiomatization; "green economy"; virtual ecological platform; student youth

I. INTRODUCTION

In the 21st century, the education of all countries of the world faced an unprecedentedly difficult task: to rethink and reorganize people's relationship with nature as soon as possible to prevent the scenario of an unstable, disastrous development of civilization [1]. The Sustainable Development Goals (SDGs) set out in United Nations General Assembly in 2015 for the year 2030 include educational goals and objectives. According to the

Sustainable Development Goals 4.7., "By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles ... and of culture's contribution to sustainable development" [2].

Achieving this goal requires the development of science, pedagogical and organizational management practice at all levels of education, innovative development [3]. It is necessary to strengthen international cooperation and interregional partnership, including on issues of greening and didactics of education, as well as interaction in the field of formation of ethno-cultural factors of sustainable development [4].

II. ESD TECHNOLOGY IN THE MODERN WORLD

Achievement of the 4.7. goal involves systemic changes in education. The time-required changes in psychology, understanding of the world and people's behavior cannot be achieved by the old methods of education [5]. The key issue of learning theory of a new time is not WHAT to learn (classic) or even HOW to learn (non-classics), but FOR WHAT PURPOSE (post-non-classics). Personal results come to the fore, the formation of a socially responsible subject of a new culture — a culture of sustainable development [6]. We are talking about the subordination of all school subjects (disciplines) content to the "end-to-end"

value-semantic content component, reflecting the nascent world-view of the new society, coming to replace the consumer society and being built on the idea of harmonizing the interests of society and biosphere the potential [7]. The key issues to be solved by didactics are: what should be the composition and structure of the "end-to-end" component of school subjects content, aimed at forming a culture of sustainable development that conflicts with the consumer society; what are the mechanisms of "resonating" this content with the content of school subjects; what is the process of constructing new content for pedagogy. The answer to these questions goes beyond the competence of subject teaching technologies [8].

New education tasks require new tools for its implementation. This is a new language, not limited to the conceptual and terminological apparatus of the concept and global goals of sustainable development, but based on the root, archetypically significant cultural concepts, both national and ethno-culturally specific, translating cultural codes of harmonious relations of society with nature. These are new didactic units of value-ideological content, which is implemented through all academic subjects, oriented to the future and of a new anticipatory nature. This is a technique of trans-objective interactions that ensure the integrity and continuity of ESD - a technique that, unfortunately, cannot benefit from many years of experience in greening, since the latter showed low efficiency in achieving personal results. These are new approaches to the design of the content of ESD, which includes several stages: conceptualization, axiomatization, contextualization (objectification), integration and transfer.

The task of the conceptualization stage is to define the general cultural core of ESD content, which answers the questions: what is the world around me? What is valuable about it? How to live in it? This is a very important stage, which involves the metaphorical modeling of the linguistic picture of the world, the choice of symbols and myths of national identity, reflecting archetypes, cultural codes, and general cultural and national values. The task of axiomatization is to pedagogically adapt and formalize the general cultural core of ESD content in the form of axioms using verbal and visual means.

An example of axiomatization is the verbal forms and visual images of six "green" axioms expressing the values of the ecological imperative — the central concept of sustainable development: (1) common environment, common destiny, common responsibility (environmental axiom); (2) the boundaries permitted by nature in any human activity (Taboo axiom); (3) Taboo on reducing natural and cultural (tangible and intangible) diversity on the planet (the axiom of preserving natural and cultural diversity); (4) an objectively existing measure of changes in the socio-natural environment (axiom of measure); (5) the need to take into account in any activity scarce resources (the axiom of the weak link); (6) the real possibility of harmony of nature, society, economy (harmonization axiom).

The task of the contextual stage is the identification of the values of sustainable development axioms in the existing

content of all academic disciplines, their objectification successively by classes; "discovery" of moral principles of behavior for sustainable development by students (principles of precaution; soft management, nature similarity, planned responsibility, incompatibility of ECO and EGO, etc.). The task of the integration and transfer stage is to combine the results of the previous stage and use them to gain experience in solving the problems of sustainable development of the local community [9].

It is impossible to reach the 4.7. goal without the synthesis of education, science and innovation. We are talking about two primary tasks: overcoming the many decades of lag in the maintenance of modern general education from the far-away science and the development of post-non-classical didactics, with appropriate training of teachers.

III. REALIZATION OF EDUCATION FOR SUSTAINABLE DEVELOPMENT IN RUSSIA

The goal 4.7. of sustainable development determines strategic directions in greening education. In the Russian Federation, the District Department of Education is implemented on the basis of the requirements of the Federal State Educational Standard to the results of studying sustainable development issues in primary and secondary school subjects, as well as to mastering the metasubject skills necessary to assess the risks of various socially problematic situations for environmental quality, human health and risk management. The principles and objectives of ESD in general education are reflected mainly in environmental education, a section of the upbringing and socialization program "Forming an ecological culture, a culture of healthy and safe lifestyle", the subject area "Technology", the subject "Ecology" at the basic level of secondary education, the state program "Patriotic education of citizens of the Russian Federation for 2016–2020".

More than 60 Russian universities conduct training in the field of sustainable development; about 20 of them train environmental specialists for various spheres of economic and cultural life of the country. Teachers of environmental education in the interests of sustainable development are trained in 18 regions of the Russian Federation.

In this respect, we want to notice the new experience of training engineering-pedagogical personnel in "Space Monitoring" field of education in the Mytishchi branch of the Bauman Moscow State Technical University, created by the reorganization of the Moscow State Forest University. This is an interesting undertaking in the field of higher education, which combines the humanitarian and engineering-technical competences of training professionals who are able to solve pressing greening problems of various spheres of economic activity. The branch is preparing the opening of new areas of training, ensuring sustainable development, in particular, of forest ecologists, which is very urgent due to the growing importance of the conservation and rational use of Russia's forest resources. In BMSTU and its branches, they conduct training for students in various fields of general, industrial and forest ecology programs, conduct scientific research and

develop modern technologies in the field of ecology for the exploration of cosmic space and space monitoring of forest resources. The leading role in the environmental training of engineers is played by the Department of Ecology and Industrial Safety, headed by A.A. Alexandrov, the Rector of the Bauman Moscow State Technical University. The traditions of ecological education and recreation supported by the main technical university of the country, the development of theoretical and methodological issues of ecological culture formation deserve attention. At the beginning of the century, in BMSTU, they held several major congresses on environmental ethics and in recent years, the head university and the Mytishchi branch continue to organize and hold international scientific conferences on the environmental outlook [10].

But there are some problems with the implementation of education for sustainable development in high school. Thus, the lack of development of certain theoretical and methodological aspects of the content design and the corresponding technologies of ESD significantly hampers its implementation in practice. In contrast to traditional science education, environmental education for sustainable development contains new elements (directions) and system interconnections, it is based on a holistic approach to man, society and nature, on the unity of modern scientific knowledge and humanistic values and worldview; it forms ecological culture of a sustainable development society.

It is not just about the adaptation of international ideas of sustainable development to the content of education. This is a look at innovative ethical, ideological ideas of ESD through the prism of Russian culture – the language, the historically formed values of Russian people, their traditions and customs, national identity, our mentality, cultural "code" of behavior, encoded in the mythology, which reproduces self-identity of our society. These were themes of the E.N. Dzyatkovskaya's report at the recent 19th Sakharov readings in Minsk [11]. The report of G.K. Dlimbetova and S.U. Abenova about the problems of decoding and using the cultural and civilizational codes of the Kazakh people in ESD was performed at the conference "EcoMir-10" in the MB BMSTU, the main provisions of this report are set out in this article below.

A number of problems and ideas of sustainable development in the educational process are reflected in the works of N.A. Zahlebyni and E.N. Dzyatkovskaya [12] [13]. A significant role in testing the developed theoretical positions in the framework of the project is played by the UNESCO Network Chair at Institute for Strategy of Education Development of the Russian Academy of Education "Environmental Education for Sustainable Development in the Global World" and the UNESCO Chair for Studying Global Issues at the Faculty of Global Processes of Lomonosov Moscow State University. Interregional network partnership [14] allows to work actively on global problems of humanity and carry out practical activities at the regional level.

Educational pilot project "Interregional network partnership: Learning to live sustainably in a global world.

Ecology. Health. Safety" is aimed at implementing education for sustainable development and complies with the UNESCO recommendations to create a network of associated educational organizations within the framework of the UNITWIN/UNESCO program (University Twinning and Networking Programme of UNESCO).

The pilot project is organized by the UNESCO Chair for the Study of Global Problems of the Faculty of Global Processes of Lomonosov Moscow State University together with the UNESCO Network Chair "Environmental Education for Sustainable Development in the Global World" at the Institute for Strategy of Educational Development of the Russian Academy of Education. Information and methodological support and site operation is provided by the Department of Education of the Tomsk Administration (information and methodological center).

The goal of the pilot project is to organize a network of interacting educational organizations, teachers, children, and their parents to disseminate ideas and better education and experience in the interests of:

- preservation of the natural and cultural heritage of Russia,
- the formation of a culture of "green" consumption and environmentally safe sustainable lifestyle of the population,
- the formation of an environmentally friendly healthy lifestyle - XXI;
- the development of intercultural communications and the promotion of peace;
- labor and professional orientation of young people to be included in the country's green economy.

The expert community of the project includes the Scientific Council on the problems of environmental education of the Russian Academy of Education; educational authorities, in whose territory there are associated educational organizations of the network partnership and other organizations.

An important role in the implementation of ESD in the Russian Federation is played by international cooperation, including within the framework of the Commonwealth of Independent States (CIS). Thus, Russian universities participate in the work of the Council on Environmental Education at the Sakharov International State Environmental Institute of Belarusian State University - the leading environmental institution of the CIS. In the greening of education for sustainable development, there is a rich and unique experience of the Republic of Kazakhstan, representing a particular interest for Eurasian integration.

IV. VIRTUAL ENVIRONMENTAL PLAYGROUND OF STUDENT YOUTH IN THE IMPLEMENTATION OF THE GREEN ECONOMY CONCEPT OF THE REPUBLIC OF KAZAKHSTAN

When solving environmental problems, the Republic of Kazakhstan adheres to the directions established in the

Sustainable Development Concept. A report on the 2019 Sakharov readings in Minsk was devoted to these questions [15]. This article will focus on some of the features of ESD in Kazakhstan.

The transition to a "green economy" and "green development" will allow our country to achieve its goal of becoming a developed country. If earlier the reforms concerned the economy and industry, now we are talking about the modernization of the consciousness of an entire people. "After all, the modernization of public consciousness will not simply complement the other modernization already begun in the country - political and economic, it should become their core" [16]. Further, according to the Concept on the transition of the Republic of Kazakhstan to a "green economy", one of the six principles is "training and the formation of environmental culture in business and among the population", the need to improve existing and develop new educational programs on the rational use of natural resources and environmental protection in the system of education and training [17]. One of the principles of the "green economy" is the "New way of thinking and enlightenment". In this regard, a program has been launched in Kazakhstan to support reform efforts and attract green technologies and investments. The program provides for the wide involvement of the public, informing about best practices and environmental education at all levels.

Therefore, the most important contemporary task facing Kazakhstan universities is not just the formation of a professional elite, but also socially responsible, active, intellectual, and spiritually developed citizens in implementing the green economy of our country.

In this regard, there is a need to create an ecoplatform to popularize knowledge in the field of environmental education for young people. After analyzing the coverage of social networks, we understand that the most active users are students. The main thing that we need to notice is that any stably existing virtual communities have their own goals and function based on the norms and rules of communication shared by the majority of participants. For this, we propose a virtual project "Ecokafe", in which students of the Gumilyov ENU and students of other educational institutions registered on the site will participate.

The goal of the project is the creation of a virtual ecological social platform for student youth for the implementation of the Green Economy Concept.

The main objectives of the environmental project are familiarizing students with sources of air pollution, studying the effects of pollutants on human health, considering methods of combating atmospheric pollution, developing students' environmental thinking for sustainable development, contributing to improving the environmental situation in the region.

The ecological project is based on the methodology of pedagogical cooperation and interactive learning methods, such as research work, observation, individual and group collaboration, brainstorming, working with statistical materials, situation analysis, a pyramid (circle) of ideas or a

tree of solutions, position taking, problem setting, supporting schemes, training elements, testing, an express questionnaire, independent work, the use of information technologies [18].

The proposed form of student activity requires qualified and constant help from a teacher who acts as a head-consultant, advisor. The project will also involve parents, representatives of the city environmental service, station employees, eco volunteers, who take part in the project as consultants and experts.

The role of the teacher is to plan activities, choose the best ways to solve the problem, predict the results of activities, gain experience in business communication in social networks, compare the results obtained with the planned ones, search for sources of information, and objectively evaluate activities. Adults can also assist in gathering materials, processing statistical data and analyzing information.

The main results of the project will be the achievement of the objectives, the growth of environmental awareness and active citizenship of university students, knowledge of environmental problems that have arisen under the influence of anthropogenic factors, including our city, knowledge of pollution control measures of atmospheric air, knowledge of the Green Economy Concept, greening of the university's territory, awareness of the need for environmental choice, understanding of the natural environment value and uniqueness, relations to nature as a living creature, the ability to find the right solutions to improve the ecological situation, the ability to compare opportunities and interests, effective communication skills, participation in society, skills in business meetings, the dissemination of environmental knowledge among city residents, the growth of independence, initiative, the development of creative thinking, the development of creative abilities [19].

In the process of working on a project, students form theoretical and practical skills, especially:

- creative thinking (the ability to evaluate different sources of information critically, to distinguish truthful information, to overcome stereotypes and prejudices, to find non-standard ways to solve problems);
- cooperation skills (the ability to cooperate with other participants in the process of overall assignment and finding ways out of problematic situations);
- perspective vision, imagination development (the ability to represent a more favorable state of the environment in the future and the desire to improve it);
- tolerance (problem solving skills);
- social activity (effective cooperation with city residents);
- communicativeness (mastering the culture of communication, linguistic ethics, enrichment of vocabulary);

- understanding that one big business consists of many small ones, and each person can influence global processes.

The main reasons for students' participation in the project is the possibility of creative self-realization, awareness of their own need in activities aimed at protecting and preserving nature, a sense of responsibility for their citizenship. Students will have the opportunity to improve the ecological situation, the beauty of nature, to realize the importance of protecting and preserving nature, understanding the connection between human health and environmental factors, and obtaining satisfaction from successfully achieving the goal.

In our opinion, this form of work with students to improve the environmental situation of the city and the whole region will give a new impulse to the development of environmental awareness of young people.

So, the most important message of the project is to inform students about environmental problems; taking care of the environment, starting with yourself, setting an example to others; engrain caring about nature from early childhood. To make eco-culture a fashion for students, the possibility of introducing eco-initiatives and environmental education in university schools is an important direction in the education greening in the Republic of Kazakhstan. Every future specialist should have environmental ethics and culture. In our case, the goal of preparing future professionals for professional activities, taking into account the ecological context, is the development of the individual's potential for the sustainable development of our country and decent work.

The described work is carried out according to the conceptual position in the framework of the ecologization of vocational education, developed by G.K. Dlimbetova, the professor of Gumilyov ENU [20] [21]. The author emphasizes that "the main methodological direction for the greening of the Kazakhstan system of professional education should be the idea of the universal readiness of future specialists to protect the environment as a result of their spiritual need" in the implementation of the Green Economy Concept.

V. CONCLUSION

Education for sustainable development assumes as the main conditions its greening, alliance with science and innovation, the creation of "green universities" in unity with the "green economy", the development of international cooperation while preserving and actively using ethno-cultural factors.

The fulfillment of these conditions will allow solving the primary tasks of ESD in the countries of the post-Soviet space: development of environmental and pedagogical science in accordance with the time challenges; bridging the gap between the content of modern general education and science; innovative development of education and appropriate training of pedagogical and environmental personnel.

"Greening" education and its transformation into environmental and other types of activity consolidates the society in the context of globalization and ensures sustainable development on the international scale [22].

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