Environmental education of Z generation students for sustainable development of rural areas (the example of the Russian-Finnish project Luga-Balt-2)

Alexandra Kartseva¹, Vladislav Minin^{2,}, Tuija Ranta-Korhonen³, Elina Nurmi⁴, and Valery Belyakov¹*

¹St. Petersburg State Agrarian University

²Federal Scientific AgroEngineering Centre VIM

³Natural Resources Finland Institute

⁴South-Eastern Finland University of Applied Sciences

Abstract. In September 2015, the UN General Assembly adopted 17 goals and 169 targets for sustainable development until 2030. The fourth goal provides for the development of inclusive and equitable quality education, and goals 12, 13 and 14 are aimed at protecting the environment and organizing appropriate education for this. When implementing environmental education, it is necessary to take into account the characteristics of a generation of students, in this case, generation Z. For a number of years, Russian-Finnish projects were carried out in the Luga district of the Leningrad region. One of the main objectives of the projects concerned the environmental education of schoolchildren and students. Using international experience, a number of interactive teaching methods have been developed and are still being used. They are focused on fostering student independence and provide his motivation. A student conducts his own research work and participates in a youth team to prepare and to implement their own projects aimed at solving local problems. This approach forms an ecological culture of an ecocentric type among students, and their desire to bear their part of responsibility for the state of the environment.

1 Introduction

On September 25, 2015, a high-level plenary meeting of the General Assembly was held at which world leaders, including heads of state and government, approved the 2030 Agenda for Sustainable Development and identified 17 goals for this. The new goals and objectives are complex and indivisible and ensure a balance of all three components of sustainable development: economic, social and environmental. The 17 Sustainable Development Goals and 169 targets which were announced demonstrated the scale and ambition of this new universal Agenda [1].

* Corresponding author: minin.iamfe@mail.ru

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

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, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development [1].

The next three goals are directly aimed at protecting the environment.

Goal 13. Take urgent action to combat climate change and its impacts;

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

The task of education is the need to convey to students the ideas of sustainable and environmentally friendly development of the World, so that students can master them and begin to build their lives and activities in accordance with these rules. How to carry out such training in the most effective way?

An important condition for successful student learning is taking into account the results of modern social theories. The theory of generations developed by American scientists Straus William & Hove Neil [2]. substantiates the existence of psychological characteristics of the perception of the world and interaction with people inherent in representatives of each age group. Accordingly, when organizing training for young people, it is necessary to focus on the characteristics of the generation to which these young people belong.

The results of the research carried out by M.V. Vorobyov [3] testify to the following:

- Representatives of the older generation note that the main feature of young people is an orientation towards material values, and the fact that the younger generation is selfish, wasteful, it is distinguished by laziness, hypocrisy, lack of culture and indifference to their native country. Nevertheless, adults still recognize the openness, benevolence, activity and courage of today's youth.
- Generation Z characterizes themselves as loyal, compassionate, open-minded, responsible, polite and responsive and, above all, are much more "creative" and "smart" than their parents and teachers.

Other researchers also note the honesty, frankness and easy vulnerability of the generation. Most of them grow up very quickly, seeing themselves as much older than their years. From the point of view of motivation to work, for representatives of generation Z, autonomy and freedom of movement are becoming more important, rather than stability of the place of work and place of residence [4, 5].

Representatives of psychiatry note a steady tendency towards an increase in the phenomena of "apathy" and "depression" (ultimately) among representatives of generation Z. What they explain by a kind of "payment" for the requirements of modernity for a high level of professionalism, readiness for high intellectual (mainly personal) loads, high requirements for self-regulation skills for long periods of time [6]. Teachers in Lithuania and the USA also pay attention to the characteristics of students of the generation Z. They think that educators need to make students feel like the most important part of the learning environment in order to ensure a deep learning approach and greater responsibility for learning outcomes. • Students should be more involved in active learning and offer a greater variety of methods for activating students. Generation Z should be offered learning styles that suit them well - discovery, exploration, experimentation, criticism, and analysis. They will learn more effectively if they deal with problem solving and finding solutions [7, 8].

Ecology as a field of knowledge is interdisciplinary. It allows generalizing in the educational process scientific, cultural, philosophical and ethical knowledge, art education, aesthetic education, cognitive, creative, labor and environmental protection activities of schoolchildren [9]. The above information on Gen Z characteristics should also be taken into account when organizing environmental education. To better link environmental education with the tasks of sustainable development, it is necessary to foster an ecocentric consciousness among young people. Ecocentric consciousness is a personal integrative quality of a person, based on an understanding of the place of a person in a hierarchically arranged world, recognition of all components of nature, including humans, as equal and parity, the need for their co-evolutionary and sustainable development in order to build a Noosphere [10, 11].

The main aim of the environmental education in Finland is to support the assimilation and development of the sustainable living. This aim is also the cross-cutting theme of the school curriculum and the idea is to guide the children on the road to the sustainable society. The schools will be in the front line in the adaption of the environmental friendly way of living and in adopting the requirements of the climate change. [12] The Government programme also promotes the environmental and nature education as one of the key tools supporting the biodiversity in Finland. [13]. In addition, the Finnish Association of Nature and Environmental schools maintains the network of nature and environmental schools and centers. The Association organizes environmental education events and provides training for teachers and educators through this network. The Urpola Nature center, which is located in Mikkeli in South-Eastern Finland, is a member of this network. [14]

A group of authors [15] proposed the concept of environmental education for students in Nizhny Novgorod within the framework of constructing a model of eco-development. The model includes three levels: philosophical and methodological, theoretical and methodological, and pedagogical.

- The philosophical and methodological level is represented by the ideas of eco-development: Noosphere, co-evolution, sustainable development, ecological culture as a key factor in changes towards sustainable development.
- The theoretical and methodological basis for the formation of the ecological culture of schoolchildren is represented by the axiological, culturological, personality-activity, co-evolutionary approaches and the principles corresponding to them.
- The pedagogical level is provided with the unity of the target, meaningful, productive and evaluative components.

Based on the above requirements and characteristics of generation Z, the purpose of our work is to describe the actions and preliminary results of the formation of environmental consciousness among schoolchildren of generation Z living in the Luga district of the Leningrad region.

2 Objects and Methods

The work is carried out both on the initiative of the Committee for Natural Resources of the Leningrad Region and within the framework of the Russian-Finnish environmental project KS1031 “Safe Environment and Cleaner Waterways to Blue Baltic Sea” (LUGABALT2) implemented from 2019 to the present. A similar project was carried out by basically the same partners from 2012 to 2014 in the same territory [16].

The object of the research was students of six schools in the Luga region.

Methods: basic interactive methods, with environmental content, used for interaction between a teacher and students, focused on mastering the methods of self-determination, self-management and, if possible, eco-centered self-development of the student's

personality. The method of sociological surveys was used to assess the effectiveness of the formation of an ecologized consciousness. Currently, a number of children's public associations are working in schools, two of them are ecological: the school forestry "Lesovichok" and the youth ecological group "Researchers".

Leading teachers and scientists of St. Petersburg State Agrarian University, Federal Scientific AgroEngineering Center VIM, Interregional Public Organization "Society for Assistance of Sustainable rural Development" as well as Natural Resources Finland Institute and South-Eastern Finland University of Applied Sciences regularly conducted classes and trainings with school students.

3 Results and discussion

By order of the Federal Forestry Agency dated 04.16.2012 No. 145, the program for the development of the movement of school forestry districts was approved. School forestry is one of the forms of extracurricular work with children. All the activities of school forestry are aimed at fostering a respectful attitude towards nature and deepening the knowledge of adolescents in the field of forestry and ecology.

Tolmachevskoe and Osminskoe school forestries were created in 2011 for children from 5 to 11 grades, about 100 schoolchildren in total. First of all, students receive information by listening to a special course, designed for 34 hours a year. The course includes two modules:

- The module "Forest Professions" introduces students to the main areas of professional activity related to the forest,
- The module "Forestry", acquaints schoolchildren with the skills of rational nature management, observation and restoration of natural resources, carrying out firefighting measures, as well as training in methods of extinguishing fires, orientation, tourism skills and first aid.

In addition to lectures, children participate in planting seedlings, in the campaigns "Save the Forest", "Clean Games", "Trees, Monuments of Wildlife", "Day of Forest Planting", etc. The members of youth forestries carry out environmental education and research work, also.

The priority activities of the Russian-Finnish project "LUGA-BALT 2" are the development and implementation of a long-term system to improve environmental education and environmental activity of schoolchildren in the Luga region. For this purpose, the Luga Public Ecological Center (LPEC) was created on the basis of the Tolmachevo school. The Center's task is to ensure a continuous process of environmental information and education of young people, as well as the organization of public environmental actions. The opening of the LPEC took place on May 20, 2019. Its first event was a seminar on household waste management, which was attended by students and teachers from pilot schools, as well as project experts. In May-June 2019, analytical equipment was purchased at the expense of the project. They have been distributed between six pilot schools in the district. Participants of environmental groups undergo training corresponding to the specialty "laboratory assistant-environmental researcher". The program, developed by SPbGAU teachers, includes seminars, workshops, independent research, and preparation of individual/group projects.

An important event was the Summer Youth Ecological Course, which took place on June 17-21, 2019 at the "Solnechnaya" tourist center, on the shore of Lake Merevskoye. All active young environmentalists from the pilot schools were brought together. The Summer Course program included: theoretical and practical classes: studying biodiversity in the territory and water quality in Lake Merevskoye, landscape design, conducting sociological research

Three thematic groups were formed from the participants of the Summer Course. Each group prepared and defended its own environmental project dedicated to the protection of water bodies in the Luga River basin or the improvement of coastal areas. The acquired knowledge and assignments allowed the students to continue their scientific work at school monitoring stations in pilot settlements. This was helped by the publication of the educational and methodological manual "Methods for assessing the ecological state of fresh water bodies" which was transferred to pilot schools in April 2020. The manual was prepared by Mrs. Yuliy Shevtsova, director of the Tolmachevo secondary school. This manual is simple and visual for conducting school scientific work with water bodies.

As a part of Finnish – Russian cross-border project “LugaBalt2” the Urpola Nature center planned a visit about water protection issues and Saimaa lake district. Saimaa is the largest lake in Finland and very important in eastern part of Finland not only economically and ecologically but also for recreational purposes. Besides Helsinki and Lapland, it is one of the most popular tourist destinations. Especially Saimaa area has many summer cottages.

In May 2021 around 30 Finnish students of the 4th grade from the local school visited the nature center as well as walked the Urpola nature trail. The nature of Saimaa is strongly influenced by the ice age of which the children were able to learn more. Many had been lucky enough to see the most well-known species of Saimaa, ringed seal. The area has recently received a status of Geopark which indicates that it has scientifically or scenically significant geological sites, interesting natural sites, and historic attractions. Saimaa Geopark Finland operates under the protection of UNESCO. After the rather heavy rainy season, the nature was green and lush. The children collected water samples, listened to birds, and examined local vegetation. Issues like the concepts of eutrophic and oligotrophic water body, what is causing eutrophication and the signs of human influence were discussed during the two-hour visit. It is good to recall how special water is for us and how everyone must take care of the water systems. At the end of the visit the children were very enthusiastic to try the interactive wall that the nature centre is utilizing in teaching.

Due to the coronavirus pandemic, face-to-face educational activities in Luga district began to decline in spring 2020. The first distance lesson in the Zoom videoconference format took place on November 30, 2020. All pilot schools took part in it, and then such activity continued. The webinars were organized on topics including the basic concepts of ecology, methods of environmental research and the importance of environmental actions in protecting the environment. It should be noted that the format of distance learning allowed Finnish partners to take an active part in this educational activity. They prepared, translated and sent materials about Finnish national parks and other issues. On 9.12.2020, a school scientific online conference was held. Each youth environmental group presented the results of their own research on water quality in the Luga River and its tributaries. A Russian-Finnish webinar dedicated to monitoring water quality in pilot water bodies of the Luga River and Lake Saimaa basins was held on December 16, 2020. Young ecologists got acquainted with similar work carried out by Finnish and Russian scientists.

Environmental Olympiad "Separate collection of household waste: learning and teaching", was held online on 28.01.2021. Olympiad included two stages. Previously, each young ecologist received a list of questions, the answers to which had to be prepared independently and sent to the organizers on the same day. In addition, the team of each school prepared a presentation on the topic: "Why sort municipal waste?" In all the speeches, the main idea was clearly traced: the younger generation is ready to bear their part of the responsibility for the state of the environment.

Summing up certain results of our activities, it should be noted that we used the main interactive methods formulated according to the classification [17]:

1. Methods for creating a favorable atmosphere, organization of communication.
2. Methods of organizing the exchange of activities.

3. Methods of organizing meaning-making.
4. Methods of organizing thought activity.
5. Methods of organizing reflexive activity.
6. Integrative methods (interactive games)

The teaching methods and educational environment were focused on the interests of the student, taking into account the characteristics of generation Z. Involvement in research, applied and aimed at converting actions was used to acquire knowledge. The structure of environmental education is shown in the Figure. Environmental education begins with information that motivates the student to move towards an ecocentric consciousness. Further formation of this consciousness is provided by conducting research work, participation in environmental actions and in group projects.

Active young environmentalists often go to various regional, national and even international events, and win competitions. On World Water Day, the All-Russian Scientific Conference "Water is the Source of Life on Earth" was held. The students from Tolmachevo pilot school presented 10 scientific works on various topics - this is the study of reservoirs, the study of specially protected natural areas of the Luga region, etc. All works were highly appreciated by diplomas of 1 and 2 degrees. As a result of the conference, a collection of scientific papers was published, where the abstracts of the work of schoolchildren from all regions of Russian Federation were published. Most of the scientific work was carried out within the framework of the Luga-Balt-2 project.

Evgenia Solovyova, a grade 8 student, scored the highest number of points and became one of the finalists of the competition, the face-to-face stage of which is supposed to be held in Artek, in October 2021.

Evgeniya presented the project "Water Analysis in the Luga River", which she carried out within the framework of the international project "Luga Balt - 2" under the guidance of a chemistry teacher Natalia Andreeva.

An assessment of the ecological worldview of schoolchildren was carried out at the end of 2019. In total, 54 schoolchildren of grades 5-7 from four pilot schools took part in the survey. All questions of the questionnaire are grouped into four blocks.

The first block included questions reflecting the general level of environmental education of the respondents. All schoolchildren indicated their participation in the improvement of territories. Among the factors influencing the ecological state to a greater extent, the most significant in the opinion of the respondents are the human factor and the impact of road transport and various industries.

The second block of questions reflects the level of awareness of the respondents on the problem of biodiversity and the interest of schoolchildren in the environment. The respondents' answers to the question about the composition of the fauna and flora of the coastal zone reflect the lack of ideas about the boundaries of the coastal zone, knowledge of rare species. Apparently, this requires additional information on the fauna and flora of the r. Meadows and its ecosystems, possibly as part of summer schools.

The third block allows you to assess the real activity of children and their families in solving environmental problems in the region. Thus, all schoolchildren pointed out the importance of cleaning and timely garbage disposal. In second place according to the answers of the respondents is the provision about the need to litter less and, thus, reduce the load associated with environmental pollution. It is very important that the majority of schoolchildren are ready to take seriously the sorting of waste for its subsequent processing.

The fourth block includes questions that reflect the real activity of schoolchildren in relation to solving specific problems, reflecting the real activity of schoolchildren in relation to solving specific problems, which is especially important from a modern point of view. Schoolchildren of pilot schools singled out the need not to litter coastal areas as the most significant factor. Schoolchildren recognize their city (village) as beautiful, but their

own activity is not obvious. However, it can be concluded that the majority of respondents are actively involved in environmental research.

Fig. 1. The structure of environmental education

4 Conclusions

An analysis of the complex of educational activities carried out allows us to state that they were successfully applied for students of pilot schools belonging to generation Z. It should be noted that in this context, distance environmental education has great prospects. First, students quickly adapt to the online format, they learn to confidently speak in front of a video camera and communicate with a large audience. Secondly, the remote form of considering topical issues allows attracting authoritative persons and high-level specialists from different countries to the discussion, who usually do not have time to participate in face-to-face events. And thirdly, online events create comfortable conditions for the participation of schoolchildren from remote settlements, where there are problems with the road transport network. Of course, not all training events can be converted into a remote form. But we can say with confidence that the educational tasks set in the project are generally being successfully carried out, despite the restrictions imposed.

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