



# Environmental education in the school system at elementary schools in Slovakia

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## ABSTRACT

Environmental education (EE) in elementary schools (6 – 15 years old) in Slovakia is not systematically defined, it is often dependent on the voluntary efforts and enthusiasm of teachers. Schoolchildren acquire environmental knowledge in a limited form during the teaching of individual subjects, especially Biology, Geography and to some extent, also Chemistry, Physics etc. In elementary schools, the school subject of EE is absent. Therefore, the aim of the presented study is to find out the current situation in formal and informal EE at elementary schools in Slovakia. We gathered data on formal EE in the form of a google questionnaire survey, in which only 18% of all elementary schools in Slovakia were willing to participate. Through some questions in the google questionnaire, these elementary schools also provided informations about the inclusion of formal, informal and non-formal education at elementary schools. Our SWOT analysis indicate a need for systematic EE in elementary schools, as well as improvements of teaching materials and teacher training in this area. At the same time, we present the EE model at the Rakovec nad Ondavou Elementary School with Kindergarten, which is included in the Green School Network and actively involved in Erasmus projects providing the opportunity to implement part of the study and internships abroad.

**Keywords:** environmental education, school system, elementary school, projects, landscape structure

## INTRODUCTION

The role of education in the face of environmental problems and opportunities is a crucial one. The idea that environmental education should be integrated into the whole system of formal education at all levels appeared already at the Intergovernmental Conference on Environmental Education in Tbilisi in 1977 (ICEE, 1978). Diversity and local sensitivity in programs of Environmental education (EE) and simple “cognitive deficit” model of knowledge that focuses on “what people don’t know” helps students to orient themselves more easily in various environmental problems, develops critical thinking (Arslan, 2012; Ernst & Monroe, 2004, 2006; Halpern, 2014; Mogensen, 1997; Moore, 2013; Saul, 2000; Uddin et al., 2020; Velepini, 2017), problem solving (Álvarez et al., 2002; Istiana et al., 2023; Sadiqin et al., 2017; Takahashi & McDougal, 2016) and effective decision-making (Winter et al., 2002). EE teaches individuals to consider different aspects of an environmental problem in order to make informed and responsible decisions (Jenkins, 2003; McGuire, 2015).

The formal educational system is traditionally viewed as a main framework for conducting Education for Environmental Citizenship. Since the average man spends only about 3% of their lifetime in school (Paraskeva-Hadjichambi et al., 2020), the ability to access, critically evaluate and utilise information must continue throughout people's lives. Non-formal and informal settings offer the opportunity for such lifelong learning. Both non-formal and informal are recognised as important arenas for educating the public about the environment (Ando & Noda, 2017; Ballantyne and Packer 2005; Goldman et al., 2013; Hollweg et al., 2011; NAAEE 2009; Soykan & Atasoy, 2012). These frameworks can support students' learning in formal education and this is increasingly acknowledged and utilised (Bell et al., 2009).

Generally speaking, environmental education or EE is an interdisciplinary process with the goal of equipping people with the knowledge, attitudes, skills, and motivation they need to help resolve environmental issues. EE does not advocate a specific opinion, procedure or practice (Başar, 2022). EE is related to ethics and actions, and it is not only a topic to be learned but a way of thinking and behavior (Begum et al., 2022; Fang et al., 2023). EE aims to provide individuals with an understanding of ecological balance and their roles in this balance, to help them develop opinions on how to live in harmony with the planet and to equip them with the required skills for efficient and responsible participation (Erol & Gezer, 2006).

Ecologically based EE is one of the best methods that help individuals learn about science and environment (Brookes, 2002; Hanifah et al., 2023). Well planned field studies outside school not only facilitate students' understanding of the world but also help them to acquire positive attitudes and values towards nature (Becker et al., 2017). Many researchers emphasise that nature education, even in short durations provides opportunities for individuals to gain information about natural processes, increases their familiarity towards nature, renders them more sensitive and aware and contributes to their independence, creativity and critical thinking (Bayindir et al., 2009; Ozaner, 2005; Palmberg & Kuru, 2001; Soykan et al., 2012).

EE is considered to be a part of the European Union's environment policy (Bomberg, 2007; Stokes et al., 2001). Regarding the Member States of the EU, there are elementary schools that cater for children until the end of the first stage of education which ends at around 11 or 12 years of age. At primary level, the majority of Member States include EE in their general statement of aims and/or values. These countries are: Austria, Belgium (Flemish and French Communities), Denmark, Finland, Germany (Bavaria and Thuringia), Greece, Ireland, Luxembourg, Spain, Sweden, UK (England, Wales & Northern Ireland and Scotland). In the curriculum documents of Denmark, Finland, Germany, Spain, Sweden and the UK (England) there is a particular emphasis on the environmental element. However, Denmark, Finland and Sweden have a system where compulsory education takes place within one comprehensive school – thus there is no transfer from an elementary to a secondary school.

In Slovakia, formal EE has been covered by the State Education Program (SEP) since 2008. The main goal of EE in elementary schools in Slovakia is to develop environmental literacy and a positive attitude towards the environment in young children, so that they can protect their planet, improve and love nature and the animals living in it (State Pedagogical Institute, 2009). The SEP has been defining the framework content of education since 2008. The EE cross-curricular topic was implemented: (1) as part of the learning content of teaching subjects, (2) through separate projects, seminars, teaching blocks, courses, etc., and (3) it can form a separate teaching subject from the framework of optional (available) lessons.

However, it is necessary to pay more attention to the solution of problems in the area of the environment than it was in the past. For this reason, the cooperation of schools with the Ministry of Education and Culture of the Slovak Republic is essential in the creation of curricula for the cross-curricular topic of EE. In 2015, the Innovative State Education Program (ISEP) was published. The goal of applying the EE cross-curricular theme is to help the school children (State Pedagogical Institute, 2017): (1) master basic rules and skills for behaviour in nature with regard to organisms and their environment; (2) recognise the main changes in their surroundings based on observing nature; (3) recognise the main characteristics of different types of environment; (4) knew and chose specific options aimed at protecting and improving their environment; (5) participated actively in improving the environment of the school and its surroundings; and (6) treated natural resources sparingly, reduced consumption, which burdens the environment.

Informal EE in Slovakia is primarily targeted towards coordinators of environmental education who work at various levels of schools, school clubs, leisure centers, eco-centers. The content of EE designed for

coordinators is concentrated in methodological days and accredited continuous education programs. The practical implementation of EE is directed towards schoolchildren and schoolchildren in the school environment, or through participation in excursions, nature schools, eco-centres, talks, or environmental events commemorating important environmental days (Hanifah et al., 2022).

EE in elementary schools (6 – 15 years old) in Slovakia is not systematically defined, it is often dependent on the voluntary efforts and enthusiasm of teachers. With the intention of finding out to what extent the role of EE in cross-sectional subjects at elementary schools is effective, we conducted research, the results of which we present in this article. It turned out that schoolchildren acquire environmental knowledge in a limited form during the teaching of individual subjects, especially Biology, Geography and to some extent, also Chemistry, Physics etc. In elementary schools, the subject of EE is absent. It turned out that the work of non-formal and informal EE cannot replace the role of EE in elementary schools. Although we present a model of EE at the Rakovec nad Ondavou Elementary School with Kindergarten, which includes EE in various teaching subjects, we still see a need for a dedicated subject of EE in elementary schools.

## OBJECTIVES

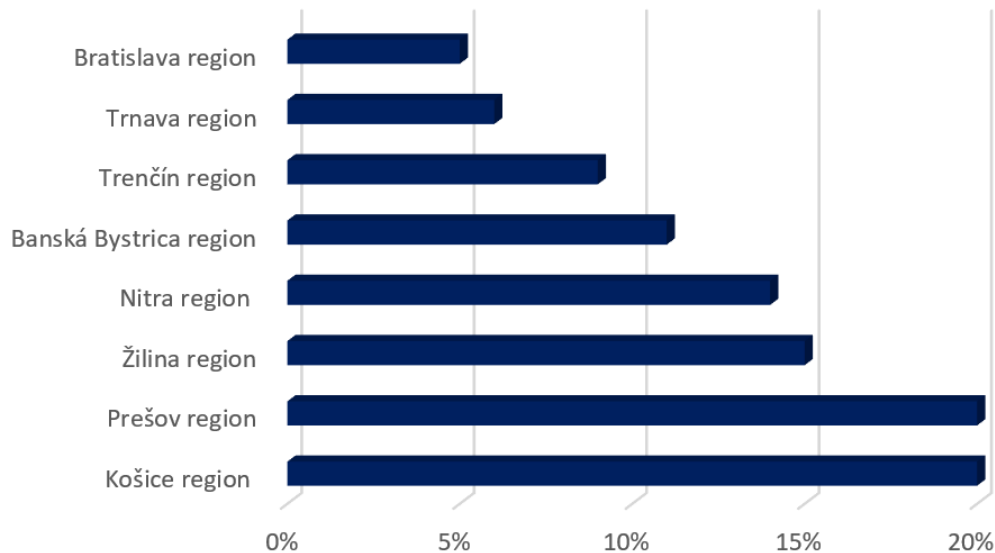
- 1) Survey of the effectiveness of the role of EE in cross-sectional subjects at elementary schools in Slovakia
- 2) Comparison of the implementation of EE in elementary schools in Slovakia, the Czech Republic, Poland, Portugal and Spain (SWOT analysis)
- 3) Proposals and verifications of methods and forms of education that can be used to teach landscape structure in EE in primary and secondary education

## METHODS

In the presented study, we evaluate the application of environmental education in elementary schools in Slovakia, using a google questionnaire survey, Excel program and SWOT analysis (See [Appendix](#)). Our research was carried out in elementary schools and elementary schools with a kindergarten in all self-governing regions of Slovakia. According to the Register of Regional Education (Ministry of Education, Science, Research and Sport of the Slovak Republic, 2023), we approached 1874 schools in Slovakia. The questionnaire survey was carried out from 12th December 2021 to 4th January 2022 in the form of an electronic questionnaire survey. The resulting answers were processed by SWOT analysis. The sample purpose questionnaire is provided as an appendix.

The ideas of Erasmus projects are based on modern scientific education, the goal of which is the development of science literacy. Their task is to arouse schoolchildren' interest in nature and to teach them how to get to know and explore it. The Rakovec nad Ondavou Elementary School with Kindergarten (coordinates 48°46'15"S 21°47'00"E) participated in two Erasmus projects. The first was the EXON project Explorers of Nature (2017 – 2020) (<http://exoneu.org/>), and the second is MADs (2020 – 2023) (<https://mads-8.webnode.cz/>). In the EXON project, we collaborated with partner schools: Bystřice Elementary School with Kindergarten in Czech Republic, Szkola Podstavova Konczyce Wielke Elementary School with Kindergarten in Poland, and Agrupamento de Escolas de Resende Elementary School in Portugal. The continuation of the EXON project is MADs (2020 – 2023) with the same partner schools from Czech Republic and Portugal, and with a new partner, Holy Family School Colegio Sagrada Familia Siervas de San José, Salamanka in Spain. Both projects were co-funded by Erasmus and Programme of the European Union. The methodological procedure of cooperation in EE consisted of meetings and visits to participating schools, exchange of experiences with EE. The Guerilla Geography survey method through photographs was used during walks, excursions and field exercises within the framework of the EXON project Explorers of Nature (2017 – 2020).

Based on practice with EE as an optional subject since 2009 and meetings within the Erasmus projects, the Rakovec nad Ondavou Elementary School and Kindergarten developed a model of EE for elementary schools. With the intention of using the landscape of the cadastral territory as an object for EE, we mapped the current landscape structure of the Rakovec nad Ondavou cadastral territory during April – November 2022. On the basis of field work, literature study and the use of climate data (Ministry of Environment of the Slovak Republic, 2002), we developed a model of landscape structure in EE.



**Figure 1.** Involvement of elementary schools of individual self-governing regions of Slovakia in the questionnaire survey/research (Source: Authors)

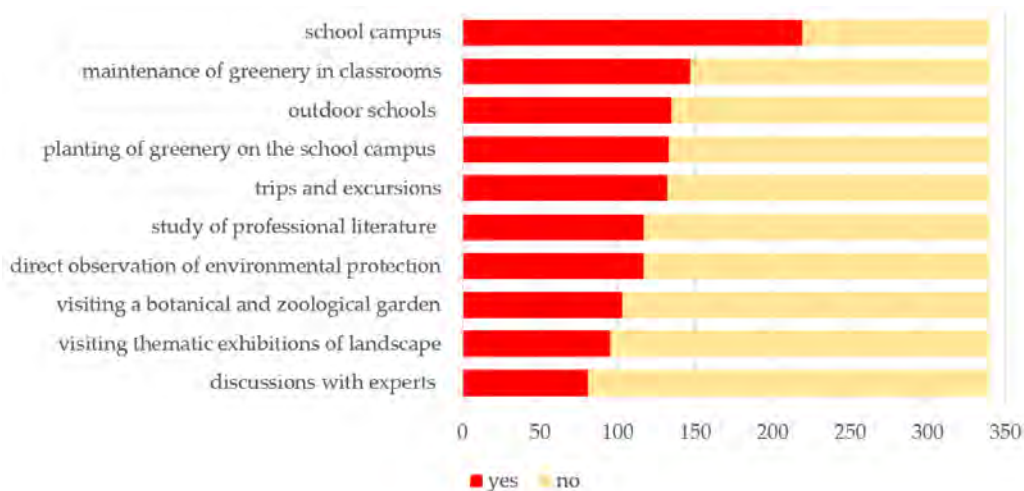
## RESULTS

Out of 1874 elementary schools and elementary schools with kindergarten in Slovakia, only 340 schools filled out the questionnaire: 19 schools in the Bratislava region, 21 schools in the Trnava region, 30 schools in the Trenčín region, 48 schools in the Nitra region, 51 schools in the Žilina region, 37 in the Banská Bystrica region, 67 schools in the Prešov region, and 67 schools in the Košice region (Figure 1). Thus, only 18% of elementary schools in Slovakia participated in the research.

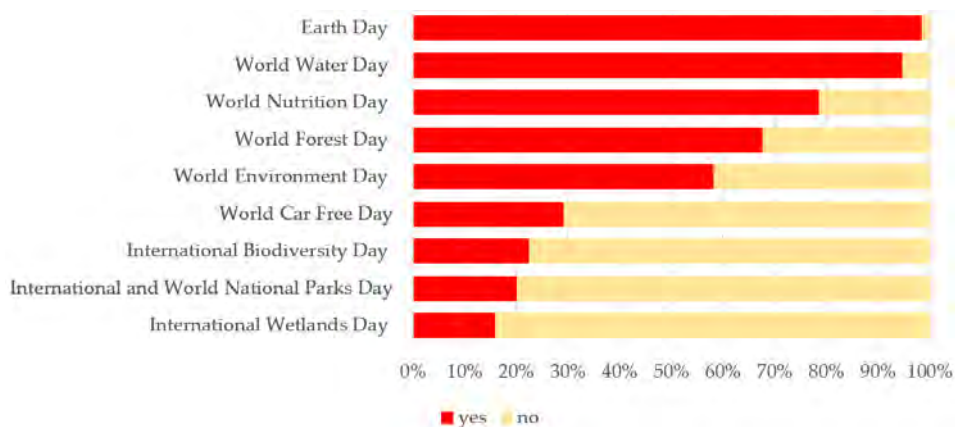
In the survey questionnaire, a total of 340 schools participated, with 212 located in rural areas and 128 in urban areas. Of these schools, 109 offered and had between 10 to 18 school classes, 92 had between 5 to 9 school classes, 80 had more than 18 school classes, and 51 had between 1 to 4 school classes.

In the participating schools, EE is implemented: (1) as part of the curriculum of teaching subjects in 92% of schools (314 schools), (2) through separate projects, seminars, teaching blocks, courses, etc. in 37% of schools (125 schools), and (3) as a separate teaching subject from the framework of optional (available) lessons in 11% of schools (37 schools). The implementation of environmental education in some elementary schools in Slovakia is more extensive. Environmental education is offered as a separate subject, mainly during the 5th and 6th grade years. The most commonly employed teaching methods in this subject are interviews, discussions, explanations, and interpretations.

Elementary schools and schools with kindergartens are committed to promoting and preserving environmental protection in various ways, including direct actions on school grounds. For instance, 219 schools focus on improving their school environment (as shown in Figure 2), while 147 schools maintain greenery in classrooms, and 133 schools plant greenery on their premises. Furthermore, 117 schools engage in direct observation of environmental protection in and around the school. In addition, many schools organise outdoor schools (135 schools), and 132 schools offer trips and excursions for their students to enhance their knowledge of the environment. Less commonly used forms of environmental education activities in elementary schools and elementary schools with kindergartens include the study of professional literature (117 schools), project-based work focused on the school's surrounding landscape, and visits to thematic exhibitions (95 schools). Discussions with experts were mentioned by 81 schools, while the least commonly used form of work was visiting a botanical and zoological garden, which was mentioned by 103 schools.



**Figure 2.** Forms of education that are used by elementary schools and elementary schools with kindergartens in the education of environmental protection (number of schools) (Source: Authors)



**Figure 3.** Participation of interested elementary schools in environmental events as World and International Days (%) (Source: Authors)

In the 2021/22 school year, 251 schools participated in the Green School program in Slovakia. Out of 340 interested schools, 87 are involved in the Green School program (<https://projectgreenschools.org/>). As part of non-formal EE, 138 elementary schools cooperate with State Nature Protection of Slovak Republic and 19 schools with the Slovak Environmental Agency.

As part of environmental management, we investigated the extent to which schools participated in accessible grant calls with an environmental focus. Unfortunately, we found that almost half of the schools (169 schools) did not participate in any grant call by the Ministry of Education, Science, Research and Sports of the Slovak Republic. Among the participating schools, 21% took part in the "Enviroprojekt grant" challenge, while 9% of schools participated in the "Health on a Plate challenge" project.

In another question, we asked the coordinators about the content of the Environmental Education Plan, which allowed us to identify the regions they focus on. It was found that 99% of schools include Earth Day in their plan, while 95% include World Water Day, 79% include World Nutrition Day, and 68% include World Forest Day. Additionally, 58% of schools include World Environment Day, followed by 29% of schools that include World Car Free Day, 22% that include International Biodiversity Day, 20% that include International and World National Parks Day, and 16% that include International Wetlands Day, among other activities (Figure 3). As part of the possibility to supplement other activities, schools most often mentioned the implementation of activities focused on the country, e.g., International Tree Day, World Animal Day, Bird Day, Sun Day, Nature Conservation Days, World Soil Day. Activities focused on people included World Milk Day, I Know What I Eat, Sweets Free Week, Apple Day, European Mobility Week and Bike to School. Additionally, schools also reported engaging in year-round waste separation.

The questionnaire also included questions about the environmental education coordinators themselves. The vast majority of the coordinators of environmental education are women (over 94%). The highest representation, 159 coordinators (47%), was in the age category of 21 and more years of teaching experience, and the lowest representation (9%) was in the category with less than 5 years of teaching experience. Only 26% of coordinators are university educated without I and II attestation. We have recorded highly qualified coordinators, with 41% stating the completion of the I attestation and 33% the completion of the II attestation.

The goal of EE is to foster a connection with nature and the environment, an understanding of ecological principles and laws, and an awareness of environmental issues. Schools primarily achieve these goals through their regular teaching curriculum (96% of schools), but also through extracurricular activities, which were reported by 79% of schools. The most commonly cited extracurricular activities were the implementation of school clubs.

### EE Within the Erasmus Projects

We conducted a comparison of environmental education in the EXON projects across Slovakia, the Czech Republic, Poland, Spain, and Portugal. The school system plays a crucial role in each country, reflecting its cultural, moral, and economic maturity. The construction of the school system is influenced by state legislation, and social, political, historical, and economic factors. It is adapted to the mentality, structure, and specificities of each country, making it unique and different from other school systems around the world.

The Czech school system is quite similar to the Slovak school system, as both countries share a common history from the time of the Czechoslovak federation, even though education was managed by their respective national governments. However, there are some differences between the two systems. In the Czech Republic, compulsory school attendance only lasts for 9 years, from ages 6 to 15, whereas in Slovakia it lasts for 10 years, from ages 6 to 16. Additionally, in the Czech Republic, the primary level in elementary school includes the 1st to 5th school years, while the lower secondary level comprises the 6th to 9th school years. On the other hand, in Slovakia, the primary level in elementary school encompasses the 1st to 4th school years.

The Elementary School and Kindergarten Bystřice in Czech Republic had 512 schoolchildren across 26 classes in the school year 2021/2022. The school uses 2 buildings for teaching, in which it has 12 specialised classrooms for teaching languages, art, ceramics, cooking, a school workshop, and a physics, chemistry and natural history classroom. EE is currently integrated into the Framework Education Plan, with no separate subject dedicated to it. Given the significance of EE, it is incorporated into individual subjects taught from the 1st to the 9th year of school. Each lesson lasts 45 minutes. At the first level, the focus is mainly on primary education and Natural Science, while at the second level, on Natural History, Geography, and also Civics and Family Education. In general, schoolchildren also encounter the issue of the importance of nature conservation in other subjects, e.g., in Physics and Chemistry – waste collection and disposal, in Geography – the existence of national parks and protected landscape areas and their protection, in Physical Education – opportunities for sports in nature. The school also cooperates with the environmental education center URSUS – an experience center in the Dolná Lomná village. As part of their EE, the school uses an apiary and 3 beehives for EE and participates in local environmental projects.

In Portugal, compulsory school attendance is 12 years and most schoolchildren start attending school at the age of 5 or 6. Basic education lasts for 9 years, from ages 6 to 15, and is structured into three cycles, lasting for 4, 2, and 3 years. The first cycle covers the first 4 school years, the second cycle covers the 5th and 6th school years, and the third cycle covers the 7th to 9th school years.

The Agrupamento de escolas de Resende is a school that comprises all the schools in the territory of the city of Resende in Portugal. The school has an enrollment of around 1,400 students between the ages of 3 and 18, including those in kindergarten, primary and secondary school. The elementary school, which has 230 students aged between 10 and 12 and 22 teachers, participated in the project. In Portugal, at the end of each cycle, students take nationwide tests in Portuguese language and Mathematics. The third year of primary school is included in this testing. The duration of each lesson is 50 minutes. When it comes to teaching natural sciences, the school follows a schedule that consists of two blocks of 100-minute lessons. In the first cycle, which covers school years 1 to 4, the subject of Environmental Studies is taught, which includes knowledge of Portuguese geography and natural sciences. There is no separate subject dedicated to environmental



**Table 1.** SWOT analysis of the EE within EXON projects

Strengths	1st – 4th year (1st cycle) – a school subject Environmental studies (PT) Be part of the HecoUSAL Community School Garden Network (Agenda 2030 Action Plan) (ES) Cooperation with Ecocenters under the supervision of educators or coordinators of EE (CZ, SK) Outdoor EE (growing flowers, planting trees, apiary, beekeeping, etc.) (CZ, SK) Quality study materials in the form of worksheets, presentations and projects (ES) Creation of landscape models in EE (ES) Green Foundation – environmental education training for teachers (SK) Cooperation with national environmental agencies (Slovak Environmental Agency connects EE with Agenda 2030, Envirostrategy 2030, UNESCO education for sustainable development of the Slovak Republic) Cooperation with national forestry centers – experience of forestry pedagogy in kindergartens and at the 1st school year of elementary schools (SK, CZ) Collaboration in EE with nature conservation and speleology museums (SK)
Weakness	No EE as a school subject, it is only a part of the School Education Plan in cross-sectional subjects (ES, CZ, PL) In the 5th – 6th school years (2nd cycle of education) and 7th – 9th school years (3rd cycle of education) there is no EE as a separate school subject (PT) A lack of a unified system of EE in elementary schools in the EU
Opportunities	In the 5th – 6th school years (2nd cycle of education) and 7th – 9th school years (3rd cycle of education), EE is taught cross-curricularly between Chemistry, Physics and Geography (PT) The School curriculum is divided into Social Sciences and Natural Sciences, not into specific subjects such as Chemistry, Physics and Geography (ES) EE is part of the subject Natural Sciences with a subsidy of 2-3 hours per week (ES) Despite no separate school subject EE in schools, they use an Environmental education plan for schools (PL)
Threats	Individual educational programs are developed independently by each school (CZ, SK) Inconsistent terminology in EE in different cross-sectional subjects (CZ, SK)

education in the second and third cycles. Instead, environmental education topics are integrated into the Natural Sciences curriculum, with a subsidy of 100 minutes in the 5th and 6th school years, and 150 minutes in the 7th to 9th school years. Additionally, the topic is also incorporated into other subjects such as Physics, Chemistry, and Geography. The school has excellent conditions for teaching EE, and it belongs to Eco-schools. In general, the school deals with the issues of natural sciences, including environmental science, for a longer period of time compared to Slovakia. Portugal offers a high quality EE.

The Spanish education system is relatively new and came into force during the 1991/1992 school year. It is regulated by the General Education System Planning Law (LOGSE). While preschool education is an integral part of the education system, it is optional. Compulsory education lasts until the age of 16 and is divided into two levels: basic education, which is for schoolchildren aged 6 to 12, and compulsory secondary education for schoolchildren aged 12 to 16. Basic education lasts for 6 years and is divided into three two-year cycles, corresponding to the age of schoolchildren: 6 to 8 years, 8 to 10 years, and 10 to 12 years, and is provided by primary schools.

### SWOT Analysis of the EE Within EXON Projects

The SWOT analysis highlighted the strengths and weakness of EE due to different school systems in countries Czech Republic, Poland, Portugal, Slovakia and Spain (Table 1). The quality of EE is affected by the possibility of teaching EE as a separate school subject. Within other school subjects, EE is not given enough attention and teachers often use different terminology. In several countries, there is a lack of quality study materials.

#### The landscape structure of a cadastral territory in EE at the Rakovec nad Ondaviu Elementary School with Kindergarten

The primary landscape structure of the cadastral territory is characterised by landscape components:

1. Geological background
2. Soil-forming substrate and soil
3. Relief
4. Water (underground, surface)
5. Climate

6. Biota (plants, animals, microorganisms)

The secondary landscape structure of the cadastral territory (Figure 4) is characterised by landscape elements:

1. Forests and non-forest woody vegetation
2. Permanent grasslands: Meadows and pastures

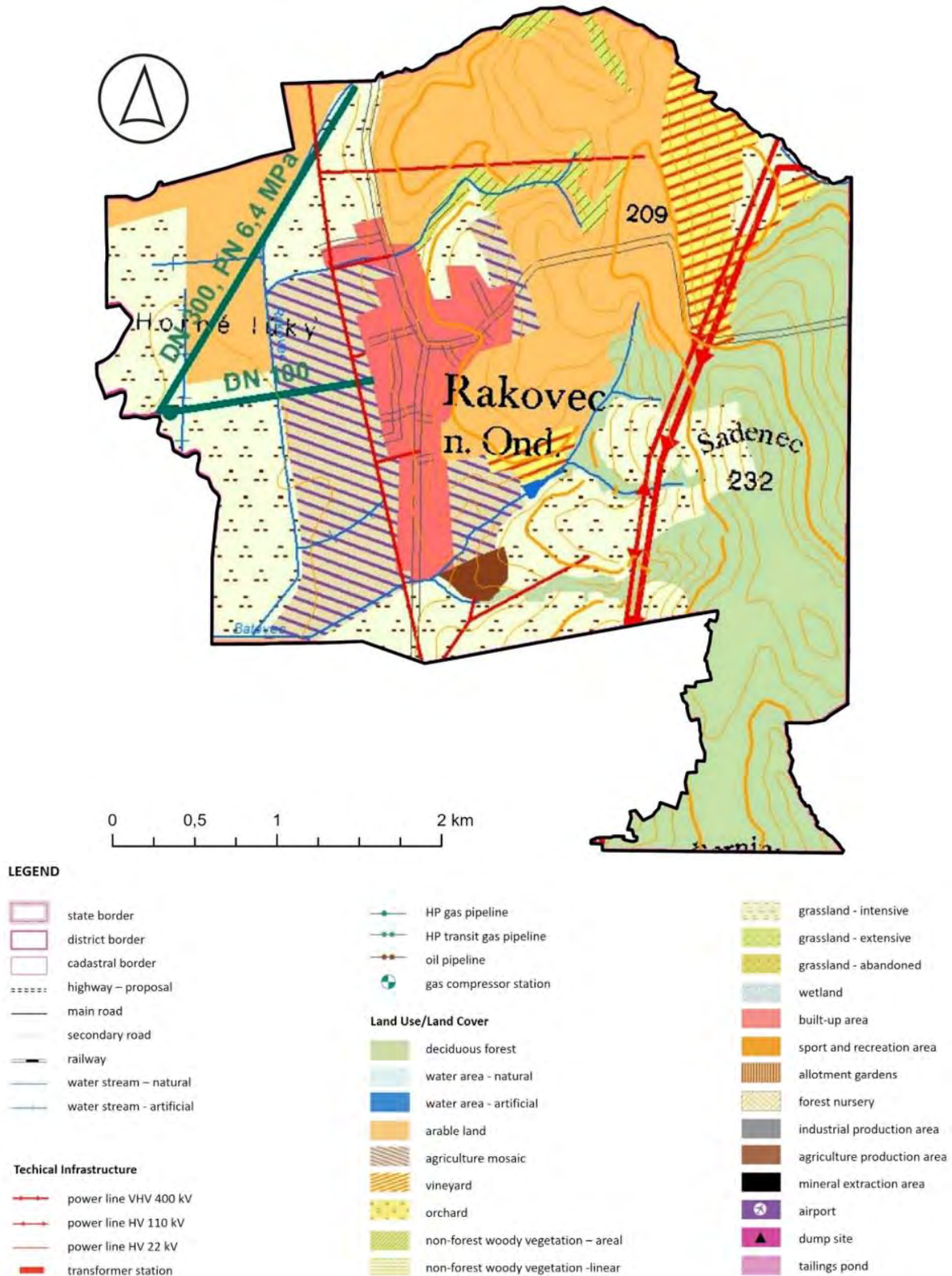


Figure 4. Secondary landscape structure of the cadastral territory Rakovec nad Ondavou (Source: Authors)



3. Agricultural cultures
4. Rocks, raw soil
5. Water surfaces
6. Residences and recreational areas
7. Technical campuses
8. Transportation

Tertiary landscape structure is influenced by socio-economic phenomena:

1. Nature protection
2. Protection of natural resources
3. Semi-natural anthropogenic phenomena and elements
4. Technical anthropogenic phenomena and elements
5. Conflicts of interests in the country, threatening and endangered phenomena and elements

We try to link the activities conducted in the educational process with specific components of the country (Table 2).

**Table 2.** Landscape components implemented in the educational process

Learning trail	Getting to know trees, the significance of trees, the forest (kindergarten; Primary Education in 1st and 2nd school years; Natural Science in 3rd and 4th school years; Biology in 5th school year; Geography in 5th and 8th school years; cross-curricular theme of environmental and regional education)
Bird trail	Connection to selected groups of birds' biodiversity (kindergarten; Biology in 5th school year, Biology in 7th school year)
Herbal spiral, medicinal herbs board	The importance of medicinal plants, their use in the treatment and prevention of diseases (kindergarten; Primary Education in 1st school year; Natural Science in 3rd school year; Biology in 5th school year)
Sensory trail	The goal is to bring the schoolchildren closer to nature. We have created a space where getting to know nature on the basis of various sensory stimuli is a deep and unusual experience for schoolchildren (kindergarten; Primary Education in 1st and 2nd school years; Natural Science in 3rd and 4th school years; Biology in 5th and 9th school years)
A didactic game with a children's playground and outdoor seating	A protected tree Summer Oak II in Rakovec nad Ondavou, a map of the National Parks of Slovakia – the importance of nature protection (Biology in 5th school year; Geography in 8th school year; Biology in 8th school year, cross-curricular theme of environmental and regional education)
Didactic game – aerial photograph of the village of Rakovec nad Ondavou	Landscape elements, its use by humans (Geography in 5th and 8th school years; Physics in 9th school year, cross-curricular theme of environmental and regional education)
Apiary, apiary, educational trail	Learning about the life and importance of bees for people, use of apitherapy (kindergarten; Biology in 5th and 6th school years)
Life and importance of bees	
Gabion garden with outdoor seating	Getting to know the geological structure, use of rocks - granite, limestone, andesite, growing vegetables, its meaning, food pyramid (first grade 1st grade, Science 3rd grade, Work Teaching 4th grade, Technology 5th-9th grade), Biology 5th, 6th, 9th grade, Geography 8th grade, Regional Education, Physics 8th grade).
Lake, walk to Ondava, Rakovec water reservoir	The importance of water in nature, learning about aquatic animals, water pollution (kindergarten, Natural Science 4th grade, Chemistry 7th, aqueous solution, evaporation, 8th grade determining the pH of water)
Insect hotel	Understanding of the functioning of nature and the importance of insects, which are an integral part of nature, because they contribute to the important pollination of plants, without which we would not have basic food (Kindergarten, first grade 1st, 2nd grade, Biology 6th grade)
Compost site	Disposal of organic waste from households and gardens, birds look for food in it in the form of small insects, valuable organic fertiliser (Kindergarten, 1st grade, 2nd grade, Biology 6th, 8th grade)
Children's transport playground, bicycle shelter	Alternative means of transport in the face of current climate change (Kindergarten, cross-cutting theme Traffic Education)

**Table 2 (Continued).** Landscape components implemented in the educational process

Protected tree	Directional signs to the 2nd oldest oak in Slovakia, information board (Natural Science 3rd, 4th grade, Geography 5th, 8th grade, Regional Education)
Weather station	Climate change, weather monitoring (Kindergarten, Natural Science 3rd grade, Geography 5th grade, 8th grade, Physics 7th grade)
Orchard	During the project week in 2019, schoolchildren from partner schools planted fruit trees typical for the country: cherry (Portugal), apple (Poland), plum (Czech Republic) and pear (Slovakia) (Kindergarten, Natural Science 3rd year, Biology 5th, 8th grade, Geography 5th grade)
Use of solar energy	Schoolyard lighting, hot water heating, herb garden irrigation, rainwater retention containers – climate change (Kindergarten, Natural Science 3rd grade, Geography 5th grade, 8th grade, Physics 7th grade)

## DISCUSSION

Many people want to protect the environment and conserve biodiversity, and many environmental organizations have similar fundamental goals. The environmental education community still debates the role of EE. Should education enable citizens to make decisions or should education be more proactive and work to change people's behavior? It is necessary to develop environmentally from childhood. Environmental education helps schoolchildren and students understand how their decisions and measures affect the environment, generates knowledge and the needed skills to address environmental issues alongside. Environmental education provides important opportunities for students to become engaged in real world issues that transcend classroom walls. The actions one can take to protect the environment and make it strong and sustainable for the future. We find this debate troubling because we feel that there is simply no time to waste, our planet currently needs to educate generations of children in environmental field with high quality. Furthermore, we agree that if we wish to 'save' the environment and conserve biodiversity, we must change behavior as soon as possible (Keene & Blumstein, 2010).

In recent times, there is a growing amount of research that addresses the negative consequences of a fast-paced lifestyle. Fast-paced have been linked to negative public health outcomes (Strazdins et al., 2011), but has also been identified as a driver of unsustainable consumer practices and thus environmental degradation and climate crisis (Rau, 2015; Rinderspacher, 2019). In an effort to change the behavior of entire generations, formal, informal and non-formal EE of young children has begun in recent years. As a result, any countries have implemented environmental education programs in elementary schools. Scientists often discuss how formal education should shape the schoolchildren's or student's base of information, opinions and attitudes towards environmental problems (Jeronen et al., 2009; Sonowal, 2009; Sukma et al., 2020). Whether and how to set up this education, which would be linked with informal and non-formal EE (Aló et al., 2020; Cole, 2013). However, each country has a different school system and other opportunities for nonformal and informal education.

More seriously, climate change is a new and different kind of problem. We agree, this is a systemic problem of such scale and complexity that fundamental and transformative changes in society's energy systems are needed (Geels, 2010; IPCC, 2018). This means fundamental and transformative changes for EE as well (Sterling, 2001). Existing frameworks for EE offer insufficient guidelines for how to prepare students for the rapidly changing realities of climate change and the renewable energy transition. As several scholars have noted (Jensen, 2004; Sterling, 2001), EE does not have a well-developed approach to systemic environmental problems that are connected to "pervasive technological and social developments" (Jensen, 2004).

Time has been shown to be a crucial factor in terms of sustaining a healthy life on this planet. Education for Sustainable Development (ESD) is considered a "key enabler" (UNESCO, 2017, 2020) for achieving Sustainable Development Goals. To support Education for Sustainable Development, it is important to understand how exactly time is dealt with in education (Grauer et al., 2022).

A global framework for implementation of ESD for the period of 2020 to 2030, "Education for Sustainable Development: Towards achieving the SDGs (ESD for 2030)" is the successor to the United Nations Decade of ESD (DESD) (2005 – 2014) and the Global Action Programme on ESD (GAP) (2005 – 2019), was adopted at the 40th session of the UNESCO General Conference in November 2019, and acknowledged by the 74th session

of the UN General Assembly in December 2019. ESD for 2030 aims to build a more just and sustainable world by strengthening ESD implementation and contributing to the realization of all 17 of the SDGs.

In Slovakia, EE is often poorly integrated into other school subjects, such as Geography, Natural science, Natural history, Geography, etc. Despite the efforts of the Ministry of Education, Science, Research and Sports of the Slovak Republic and Ministry of Environment of the Slovak Republic to support elementary schools in the field of EE, only few schools take advantage of these opportunities. It often happens, the coordinators of environmental education only do the mandatory activities ordered by the school director. This situation was also confirmed when filling out the questionnaire. Slovakia therefore needs to incorporate EE into school educational plans as a separate school subject, supplemented by informal and non-formal environmental activities, and, at the same time, to motivate and train environmental education coordinators.

Considering the answers in the questionnaire, we also see other problems in EE in Slovakia. EE is not built on a systematic basis. Knowledge is gained in several subjects, although almost all of them the topics of sustainable development are contained in a set of subjects, however, coordination between individual subjects is often a problem. Each subject is taught by a different teacher, which makes this coordination difficult systematization of EE. On the one hand, there is risk repetition of topics in several subjects, e.g. issues of global problems is included in natural history, geography, chemistry, etc. On the second on the other hand, there is a risk that the topics in the curriculum are very defined in general and it may happen that they will be minimized, maybe even deleted. The curriculum is built in such a way that it is primarily about acquisition theoretical knowledge, often with no connection to understanding the real problems of their immediate environment. Learning about many they learn about phenomena and processes taking place in the country only from textbooks description, without the possibility of monitoring these phenomena and processes directly in the country. Topics focused on the region, observation, field work are recommended as practical work. However, practical work is very time-consuming and in practice they apply relatively little.

Besides the formal infusion of environmental education across the curriculum, there are numerous societies and groups who assist schools in the informal infusion of environmental education. We agree that the infusion of EE refers to the process of insertion, integration and relation to the environment in formal and informal education. The main factor is the teachers successful infusion programs (Winther et al., 2002). Approaches of the environmental teacher success includes practicing student-centered learning, using students' strengths, and demonstrating experience teaching orientation, use cooperative techniques, involve external experts and constantly reflect and plan lessons (May, 2000). Ernst (2007) found that teachers who have strong environmental literacy knowledge, they have support in their schools, environmental sensitivity, positive environmental attitudes and they are receptive to environmental education. These teachers are the ones who will try to fill the environment education.

As a part of the cooperation in the EXON project, we understood the importance of EE in elementary schools and the meaning of outdoor EE. Teaching in nature is an opportunity to combine theory with practice, to diversify and improve the quality of the teaching process, but also to improve the physical and mental condition of schoolchildren and a positive perception of teaching, developing spatial thinking. It develops creativity and imagination.

Attachment to the place and connection with nature indicate a possible path to the development of the student's relationship with the natural world. Several studies suggest that individual encounters and experiences with nature can provide a pathway to environmental behaviour, and that time spent in nature when young can have lasting impact on children's attitudes to the natural environment through their lives (Beery & Wolf-Watz, 2014; Chawla & Cushing, 2007; Cheng & Monroe, 2012; Collado et al. 2015; Pretty et al. 2009). Outdoor EE programs are a crucial tool for promoting children's and adolescents' pro-environmental attitudes and behaviors, as well as their feelings of connection to nature, and pursuing the goal of reducing human impact on the environment and natural resources therein.

Our research in the cadastral territory of Rakovec nad Ondavou shows that some of the central tenets of landscape school practice are important in underpinning the opportunity to develop a relationship with nature and attachment to place: (1) the frequent and repeated nature of visits to landscape, which allows children to return, re-explore, and become more familiar with the setting, (2) the importance of play and time for

exploration, and (3) child-lead learning, which enables children to follow their own interests and engage in enquiry.

We think, the importance of the landscape as a natural environmental laboratory lies in several aspects: (1) in the assessment of the properties of individual landscape – forming components, in the monitoring of phenomena and processes taking place in the country, whether natural or cultural-historical anthropogenic; (2) in obtaining, or in repetition you are not only ecological and environmental knowledge, but also knowledge from other subjects – geographical, geological, botanical, zoological; and (3) in the possibility of confronting acquired knowledge about the country and human activities implemented in the country with the fact; (4) in the activation of schoolchildren in the field of environmental protection and creation – stimulating interest in environmental care; (5) in stimulating creativity, competitiveness and competition, in the development of team cooperation; and (6) in acquiring skills and getting to know new techniques and possibilities schoolchildren' independent work – creation of model situations, assignment of problem situations tasks, solving them using various methods – quizzes, competitions, puzzles, ecological games, etc.

We see great importance for schools in local environmental textbooks. Textbooks often become a political issue because they reflect society's educational canon and the constant negotiation processes that shape it. But at the same time, through their choice of content and pedagogy, textbooks can make a significant contribution to peace education, human rights education, global citizenship education and sustainable development (ESD) education by providing young people with the ability to freely come to independent opinions.

It would be a great benefit to process and systematise the "scattered" information in individual subjects into a unified whole and develop it in a logical sequence. This way, the topic of sustainable development could be comprehensively included in the teaching process of various subjects and, above all, made comprehensible and illustrative for schoolchildren, and would contain not only informative but also educational elements.

A global framework for implementation of ESD for the period of 2020 to 2030, "Education for Sustainable Development: Towards achieving the SDGs (ESD for 2030)" is the successor to the United Nations Decade of ESD (DESD) (2005 – 2014) and the Global Action Programme on ESD (GAP) (2015 – 2019), was adopted at the 40th session of the UNESCO General Conference in November 2019, and acknowledged by the 74th session of the UN General Assembly in December 2019. ESD for 2030 aims to build a more just and sustainable world by strengthening ESD implementation and contributing to the realization of all 17 of the SDGs.

We think it would be important to deal with EE for sustainable development in Slovak school system. ESD is rooted in traditions of EE and global citizenship education (Michelsen & Fischer, 2017). Studies focusing on curricula from an ESD perspective either focus on analyzing the extent of ESD-related content in national curricula (Jóhannesson et al., 2011), the comparison of the interrelation between sustainability policies and ESD (Aikens & Mckenzie, 2021) or cross-national comparisons of subject-specific curricula (Bagoly-Simó, 2014). The ability to use the resource "time" in sustainable ways should be a central focus of ESD. Indeed, there are some conceptual works (Görtler, 2016; Reheis, 2007) as well as few pedagogical practice materials exploring the link between ESD and time.

The newly adopted Council Recommendation on learning for the green transition and sustainable development underlines the importance of investing in education for environmental sustainability and interconnecting learning across the environmental, economic and social pillars of sustainable development (European Trade Union Committee for Education, 2022). It also recognises the lack of systemic approach to learning about environmental sustainability in education and training across the EU. Among other things, the Council Recommendation suggests that Member States. Establish learning for the green transition and sustainable development as one of the priority areas in education and training policies and programmes; Provide learning opportunities in formal, non-formal and informal settings; Support and enhance teaching and learning for the green transition and sustainable development by providing infrastructure, digital tools and resources and building in particular on the new European Competence Framework on Sustainability; Develop further whole-institutional approaches to sustainability incorporating teaching and learning, governance, infrastructure, and engage all members of the learning community and local and wider communities; Provide teachers and other education personnel with further targeted support, expertise and training opportunities to incorporate the principles of green transition and sustainable development, and to

deal with eco-anxiety and eco-pessimism. Therefore, we propose the inclusion of EE in formal education as a separate subject and a detailed connection of formal, non-formal and informal environmental education not only on the territory of Slovakia, but uniformly throughout the European Union.

## CONCLUSION

In 1996, the Ministry of Education of the Slovak Republic defined the environmental minimum within the curriculum for elementary and secondary schools, which schoolchildren should acquire during their schooling. The environmental minimum includes a range of topics: preservation of biodiversity, deforestation, soil erosion, rational use of natural resources, pollution of air, water, soil, depletion of the ozone layer, acid rain, greenhouse effect, energy consumption, waste management, urbanisation and population growth. In 2006, a new concept of EE and training was developed at all levels of schools in the Slovak Republic and in the system of lifelong education. The concept, approved in June 2006 by the Minister of Education of the Slovak Republic, considers education and training for sustainable development to be a key factor in EE and training.

Currently, the policy for EE, training and awareness (EVVO) in the Slovak Republic is based on various strategic documents adopted at the national and international levels. The most comprehensive international document is the 2030 Agenda for Sustainable Development (Agenda 2030) approved by the UN General Assembly (United Nations, 2018). The topic of EE and training at any age is addressed in the Environmental Policy Strategy of the Slovak Republic until 2030 (Envirostrategy 2030). It lays out objectives and action plans for streamlining the system of formal and non-formal environmental education, as well as education and awareness for sustainable development. A key priority is to encourage responsible consumption and nature conservation, as well as improving environmental awareness through cultural and natural heritage and tourism.

Formal EE in Slovakia is concentrated in school-type facilities and is coordinated by the Ministry of Education, Science, Research and Sports of the Slovak Republic (The Ministry of Education, Science, Research and Sport of the Slovak Republic). Since 2015, it has been part of the goals, performance and content standards of the Innovative Practices Into the Education System, in which it is defined as a cross-curricular topic falling under the relevant educational areas at the relevant levels (from pre-primary education to upper secondary education). On the basis of Innovative Practices Into the Education System, it is possible to implement EE as part of the curriculum of teaching subjects, through separate projects, seminars, teaching blocks or as a separate teaching subject from the framework of optional lessons.

In Slovakia, there are 1874 elementary schools, or elementary schools with a kindergarten, registered in the Register of regional education (Ministry of Education, Science, Research and Sports of the Slovak Republic, 2023). However, only 18% of schools (340 schools) answered the questionnaire on EE. EE is implemented in Slovakia: (1) as part of the curriculum of teaching subjects (92% of schools), (2) through separate projects, seminars, teaching blocks, courses, etc. (37% of schools), and (3) as a separate teaching subject from the framework of optional (available) lessons in 11% of schools (37 schools). The implementation of EE in some elementary schools in Slovakia is more extensive. EE is offered as a separate subject, mainly during the 5th and 6th grade years.

Most of the coordinators of environmental education are women (over 94%). The highest representation, 159 coordinators (47%), was in the age category of 21 and more years of teaching experience, and the lowest representation (9%) was in the category with less than 5 years of teaching experience. Only 26% of coordinators are university educated without I and II attestation. We have recorded highly qualified coordinators, with 41% stating the completion of the I attestation and 33% the completion of the II attestation.

In the Slovak Republic, EE is not taught as a standalone subject in elementary schools, but instead, various environmental topics are integrated into other subjects. EE is understood here as an organic part of the comprehensive upbringing and education process. The main subjects covering environmental education are Music, Natural Science, Natural History, Geography, as well as Chemistry and Physics. However, through our participation in Erasmus projects, we recognised the importance of having a separate subject exclusively devoted to environmental education. We are also aware of the need for local teaching, focused on the landscape structure of the territory the school and community are situated.



Elementary schools mostly fulfil these goals of EE through their teaching process (96% of interested schools), but also through extracurricular activities, which were reported by 79% of interested schools. Non-formal EE and training is provided by the Ministry of the Environment of the Slovak Republic through the involvement of departmental organisations. Individual departmental organisations prepare a number of initiatives and events that aim at raising awareness in the field of environmental protection and its related aspects, as well as in the field of practical EE and training. These are educational activities with the use of interactive elements: events on the occasion of important environmental days, open days at departmental organisations, one-day or multi-day educational events, discussions for schools of all categories, events for marginalised groups, exhibitions, excursions, film festivals. Additionally, they organise professional conferences, seminars for various target groups as well as methodological days and accredited continuous education for teachers. They also engage in editing, publishing and promotional activities related to EE.

EE aims to foster an optimal relationship with the environment in the educational space of the family, school and other supplementary educational programs (courses, projects, ecological minimums, after-school programs, etc.). Therefore, the school subject of EE should be included in the general education subjects in elementary schools. Thus, we recommend EE: (1) to systematically define it in the teaching process, it often takes place only on the basis of the voluntariness and enthusiasm of teachers in other subjects, (2) to unify the environmental terms and terms that are currently used differently in different projects, (3) to update the curriculum of EE, which currently tends to focus mainly on global problems with a tendency to catastrophize environmental issues, (4) modify the curriculum to strengthen the contact with nature and focus on the real problems of the country and the environment, (5) reevaluate current ecology textbooks for elementary schools, which are outdated in terms of their content and application level and lack a direct connection to the national, regional and local landscape and nature, (6) to make the teaching process more efficient at all levels of education by incorporating activating forms of teaching (walks, excursions, residential programs in nature, cultivation work, etc.) new didactic methods (projects, program, thematic or group teaching, etc.) and the development of alternative schools, and (7) more actively apply for environmental grants.

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## APPENDIX

### Questionnaire: Environmental Education in Elementary Schools and Elementary Schools with Kindergarten

#### Information about your school

1. Please, fill location of the school in the Self-Governing region of Slovakia:

- Bratislava region
- Trnava region
- Trenčín region
- Nitra region
- Žilina region
- Banská Bystrica region
- Prešov region
- Košice region

2. According to localization, the school is:

- rural school
- urban school

3. Number of classes in the school:

- 1 – 4
- 5 – 9
- 10 – 18
- more than 18

#### Informations about the coordinators of environmental education:

1. Gender:

- male
- female

2. Age:

- up to 30 years old
- 31 – 40 years old
- 41 – 50 years old
- 51 – 60 years old
- 61 years old and over

3. The length of your teaching experience:

- up to 5 years
- 6 – 10 years
- 11 – 15 years
- 16 – 20 years
- 21 years and over

4. Level of education:

- college/university
- college/university and 1 certification
- college/university and 2 certifications

**Informations about environmental education in your school:**

1. Your school implements the cross-cutting topic environmental education (EE) in Schools educational program such as (select multiple answers):

- a separate school subject
- part of the content of individual subjects and thematic educational plans
- through separate projects, seminars or teaching blocks

2. Indicate the school year in which you teach EE as a separate subject (select multiple answers):

- 1st year
- 2nd year
- 3st year
- 4th year
- 5th year
- 6th year
- 7th grade
- 8th year
- 9th year
- EE is not a separate school subject

3. EE goals are met at (select multiple answers):

- in the teaching process
- in extracurricular activities

4. Educational Plan of the school includes (select multiple answers):

- World Car Free Day
- World Nutrition Day
- World Forest Day
- International Day of Water
- Earth Day
- International Wetlands Day
- International and World Day of National Parks
- International Biodiversity Day
- World Environment Day
- other

5. Mark the most frequently used forms of work in EE (select multiple answers):

- observation of the environment at school and in surroundings
- study of professional literature
- projects thematically focused to the country in around the school
- visitation of botanical, zoological gardens
- visitation of thematic exhibitions
- conversations with experts
- participation in knowledge competitions
- practical application knowledge

6. The school cooperates with state and non-governmental organizations (select multiple answers):

- State Nature Protection of the Slovak Republic
- Slovak Environmental Agency
- Slovak Innovation and Energy Agency
- Daphne (non-governmental organization)
- Živica „Resin“ (non-governmental organization)
- other

7. The school is included in the Green School program:

- Yes
- No

8. To implement EE, you used funds obtained from foundations and grants (select multiple answers):

- we don't use
- „Environmental project“ (governmental organization)
- „Health on a plate project“ (governmental organization)
- Živica „Resin“ (non-governmental organization)
- Strom života „Tree of Life“ (non-governmental organization)
- „Operational Program Education“ (governmental organization)
- „Carpathian Foundation“ (non-governmental organization)
- „Slovak Gas Industry Foundation“ (non-governmental organization)
- other

9. During learning about landscape structure, you emphasize on (select multiple answers):

- field walks
- field exercises
- study of literature
- project task
- explanation
- monitoring of phenomena and processes in the landscape

Thank you!

