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SNEŽANA LJEŠNJAK, MSc

IMPLEMENTATION OF THE EDUCATION FOR SUSTAINABLE DEVELOPMENT IN ELEMENTARY AND HIGH SCHOOLS IN MONTENEGRO

DOCTORAL DISSERTATION

Podgorica, 2024

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SNEŽANA LJEŠNJAK, MSc

IMPLEMENTACIJA OBRAZOVANJA ZA ODRŽIVI RAZVOJ U OSNOVNIM I SREDNJIM ŠKOLAMA U CRNOJ GORI

DOKTORSKA DISERTACIJA

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INFORMATION ABOUT THE DOCTORAL STUDENT, MENTORS AND MEMBERS OF THE COMMISSION

PhD student:

Name and surname: Snežana Lješnjak

Date of birth: 24 April 1986 in Podgorica

Name of completed master studies and year of completion: Faculty of Science and Mathematics, University of Montenegro, Department of Biology, 2009

Mentor: Danka Caković, PhD full professor of the Faculty of Science and Mathematics, University of Montenegro

Co-mentor: Andrej Šorgo, PhD full professor of the Faculty of Science and Mathematics, University of Maribor, Slovenia

Commission members:

Commission member: Danilo Mrdak, PhD full professor of the Faculty of Science and Mathematics, University of Montenegro.

Commission member: Dijana Vučković, PhD associate professor at the Faculty of Philosophy, University of Montenegro.

President of the commission: Anđelka Šćepanović, PhD associate professor of the Faculty of Science and Mathematics, University of Montenegro.

Date:

PODACI O DOKTORANDU, MENTORIMA I ČLANOVIMA KOMISIJE

Doktorandkinja:

Ime i prezime: Snežana Lješnjak

Datum rođenja: 24. 4. 1986. u Podgorici

Naziv završenih magistarskih studija i godina završetka: Prirodno-matematički fakultet Univerziteta Crne Gore, Odsjek za Biologiju, 2009.godine

Mentor: prof. dr Danka Caković, redovna profesorica Prirodno-matematičkog fakulteta Univerziteta Crne Gore

Ko-mentor: prof. dr Andrej Šorgo, redovni profesor Prirodno-matematičkog fakulteta Univerziteta u Mariboru, Slovenija

Članovi komisije:

Član komisije: prof. dr Danilo Mrdak, redovni profesor Prirodno-matematičkog fakulteta Univerziteta Crne Gore.

Članica komisije: prof. dr Dijana Vučković, vanredna profesorica Filozofskog fakulteta Univerziteta Crne.

Predsjednica komisije: prof. dr Anđelka Šćepanović, vanredna profesorica Prirodno-matematičkog fakulteta Univerziteta Crne Gore.

Datum:

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DATA ON THE DOCTORAL DISSERTATION

Title of doctoral studies: Sustainable development

Title of doctoral dissertation: Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro

ABSTRACT

A sustainable future can be considered one of humanity's most important goals, and education is recognized as one of the components that will be needed to realize this goal. It plays a key role in shaping the consciousness and habits of young generations who will be the bearers of important decisions in the future, and teachers' role in forming their personalities is essential. In Montenegro, since 2014, the Cross-curricular Program of Education for Sustainable Development (ESD) program has been implemented in elementary schools, and since 2015 in high schools. Within this dissertation, during the 2022/23 school year, three studies were conducted, which can be methodologically described as non-experimental educational research using questionnaires as an instrument for collecting data from three populations of respondents. To answer research questions about the implementation of ESD program in elementary and high schools in Montenegro, the selected samples were teachers of elementary and high schools in Montenegro (N = 1065), students of the first grade of high school in all high schools in Montenegro (N = 705), and students in the first year of studies at faculties in Montenegro (N = 513).

The first study's results showed that 41.6% of teachers were familiar with the ESD program, but only half included it in their teaching practice. The highest level of familiarity is among teachers in elementary schools and the lowest is among teachers of high vocational schools. Monologue and dialogue have proven to be dominant while teaching methods that

allow students direct contact with nature are used very rarely or never. The main obstacles to the (non)inclusion of ESD are listed as lack of adequate literature, need for quality training, lack of a competent institution to control implementation, inadequate salaries of teachers, and lack of teaching aids.

The results of the second study showed that first-grade high school students did not show a clear positive attitude towards items that reflect a sustainable way of thinking and acting. This is indicated by a median of 4 (on a scale of 1-7 between bipolar adjectives) for all offered items. Five out of eight topics from the ESD program are implemented in several subjects in the range of 28-41% of respondents. The goal of implementing all eight cross-curricular themes of the ESD program in multiple subjects has not been achieved. Only three topics (Health Education, Human Rights, and Environmental Protection) reached the level of around 40%. At the end of the range and close to 10% are Biodiversity and Green Economy. The highest familiarity is about three-quarters of the respondents for the topics of Environmental Protection and Biodiversity. They are the least familiar with the topics of Entrepreneurial learning and the Green Economy, which about two-fifths of respondents are hearing about for the first time. Sustainable development, sustainable agriculture, the European Union, and the "green economy" are topics that almost a third of students have never encountered. The conventional teaching method (the teacher teaching the lesson while the students passively listen) was very often used by 78.4% of respondents during elementary school education.

The third study shows that first-year students expressed a rather positive attitude towards items that reflect a sustainable way of thinking and acting (medians of 2-4 on a scale of 1-7 between bipolar adjectives). There is no statistically significant difference between the

groups of high school students who completed gymnasium and those from high vocational schools, and all *rrb* values are negligible. The goal of cross-curricular implementation of all eight topics from the ESD program was not achieved. Only three topics (Health Education, Human Rights, and Environmental Protection) reach the level of around 30%. The lowest range of cross-curricular implementation (around 7%) was reported for Biodiversity and Green Economy. The highest level of familiarity during high school (about three-fifths) is with the topic of Environmental Protection, while the lowest amount is a sixth for the Green Economy and a fifth for Entrepreneurial Learning. For teaching content within the eight cross-curricular topics, in almost all items the highest frequency values are precisely those that show that students have never encountered them during their high school education. The range of these frequencies goes from about a fifth (Industry as a source of environmental pollution; Significance, composition, and sources of air pollution), up to half (Biological hazards; "Green" traffic) and two-thirds of respondents (Ecoremediation). Comparing respondents from different high schools, there are no statistically significant differences. Regarding the frequency of teaching methods used in the inclusion of ESD content in high schools, the most prevalent method is the teacher delivering a lesson while students listen (70%). There is a statistically significant difference between the groups only in the categories 'teacher delivers a lesson, students listen' and 'ecological sections.' Both of these methods were used more frequently with students who completed gymnasium.

The conclusions from all three studies are that the ESD program is not widely implemented, despite its mandatory nature. This highlights the imperative need for comprehensive training of teachers of all subjects to ensure expertise in implementation. In addition, it is crucial to address the preconditions for smooth implementation, including the

provision of teaching aids, teacher motivation, implementation control, and appropriate literature, forming smaller classes (with an average of 20 students), and adopting the teaching practices of Scandinavian educational systems and integrating them into Montenegro's educational framework. These measures would establish a strong foundation for the successful implementation of ESD and encourage greater awareness among students about the vital role that sustainable development plays for humanity.

Keywords: education for sustainable development; elementary school teachers; high school teachers; first-grade high school students; first-year faculty students; elementary school; gymnasium; high vocational schools; goals of sustainable development;

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Naziv doktorskih studija: Održivi razvoj

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PROŠIRENI REZIME NA SLUŽBENOM JEZIKU

Održiva budućnost se može smatrati jednim od najvažnijih ciljeva čovječanstva, a obrazovanje je prepoznato kao jedna od komponenti za njeno ostvarenje. Ono igra ključnu ulogu u oblikovanju svijesti i navika mladih generacija koji će biti nosioci važnih odluka u budućnosti, a uloga nastavnika u procesu formiranja njihovih ličnosti je od suštinskog značaja. U Crnoj Gori se od 2014. godine u osnovnim školama implementira Međupredmetni program Obrazovanje za održivi razvoj (OOR), a od 2015. godine u srednjim školama. U okviru ove disertacije, tokom školske 2022/23. godine, sprovedena su tri istraživanja koja se metodološki mogu opisati kao neeksperimentalno pedagoško istraživanje s upotrebom upitnika kao instrumenta za prikupljanje podataka iz tri populacije ispitanika. Da bi se odgovorilo na naučna pitanja o implementaciji Obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori odabrani uzorci su bili nastavnici osnovnih i srednjih škola u Crnoj Gori (N = 1065), učenici prvog razreda srednje škole u svim srednjim školama u Crnoj Gori) (N = 705) i studenti prve godine studija na fakultetima u Crnoj Gori (N = 513).

Rezultati prve studije pokazali su da je 41,6% nastavnika upoznato sa OOR programom, ali ga je samo polovina uključila u svoju nastavnu praksu. Najviši nivo upoznatosti je među nastavnicima u osnovnim školama, a najmanji među nastavnicima srednjih stručnih škola. Monolog i dijalog se pokazuju kao dominantne, a nastavne metode koje učenicima omogućavaju direktan kontakt sa prirodom koriste se veoma rijetko ili nikada.

Kao glavne prepreke (ne)uključivanju OOR-a navodi se: nedostatak adekvatne literature, potreba za kvalitetnom obukom, nepostojanje nadležne institucije za kontrolu implementacije, neadekvatne zarade nastavnika i nedostatak nastavnih sredstava.

Rezultati druge studije su pokazali da učenici prvog razreda srednje škole nisu ispoljili jasan pozitivan stav prema stavkama koje odražavaju održivi način razmišljanja i djelovanja. Na to ukazuje medijana 4 (na skali od 1-7 između bipolarnih pridjeva) za sve ponuđene stavke. Pet od osam tema iz programa OOR se implementira u više predmeta u rasponu od od 28-41% ispitanika Cilj da svih osam međupredmetnih tema OOR programa budu implementirane kroskulikularno, nije postignut. Samo tri teme (Zdravstveno obrazovanje, Ljudska prava i Zaštite životne sredine) dostižu nivo od oko 40%. Na kraju opsega i blizu 10% su Biodiverzitet i Zelena ekonomija. Najveća upoznatost iznosi oko tri četvrtine ispitanika za teme Zaštita životne sredine i Biodiverzitet. Najmanje su upoznati sa temama Preduzetničko učenje i Zelenom ekonomijom, za koje oko dvije petine ispitanika prvi put čuje. Održivi razvoj, održiva poljoprivreda, Evropska unija i „zelena ekonomija“ su sadržaji sa kojim se skoro trećina učenika nikada nije susrela. Konvencijalna nastavna metoda (nastavnik koji predaje lekciju dok učenici pasivno slušaju), se veoma često koristila kod 78,4% ispitanika tokom osnovnoškolskog obrazovanja.

Treća studija pokazuje da su studenti prve godine studija iskazali prilično pozitivan stav prema stavkama koje odražavaju održivi način razmišljanja i djelovanja (medijane od 2-4 na skali od 1-7 između bipolarnih pridjeva). U tome nema statistički značajne razlike među grupama srednjoškolaca koji su završili gimnaziju i onih iz srednjih stručnih škola i sve *rrb* vrijednosti su zanemarljive. Cilj međupredmetne implementacije svih osma tema iz programa OOR nije postignut. Samo tri teme (Zdravstveno obrazovanje, Ljudska prava i Zaštita životne

sredine) dostižu nivo od oko 30%. Najmanji opseg međupredmetne implementacije (oko 7%) iskazan je za Biodiverzitet i Zelenu ekonomiju. Najveća upoznatost tokom srednje škole (oko tri petine) je za temu Zaštite životne sredine, dok najmanj iznosi šestinu za Zelenu ekonomiju i petinu za Preduzetničko učenje. Za nastavne sadržaje u okviru osam međupredmetnih tema, u gotovo svim stavkama su najviše vrijednosti frekvencije upravo one koje pokazuju da se studenti nikad nisu sa njima susreli tokom školovanja u srednjoj školi. Opseg tih frekvencije ide od oko petine (Industrija kao izvor zagađenja životne sredine; Značaj, sastav i izvori zagađenja vazduha), pa sve do polovine (Biološki hazardi; „Zeleni" saobraćaj) i dvije trećine ispitanika (Ekoremedijacija). Komparacijom ispitanika koji potiču iz različitih srednjih škola, nema statistički značajne razlike. Što se tiče frekvencije nastavnih metoda u inkluziji sadržaja o OOR u srednjim školama, ubjedljivo najučestalija je da nastavnik predaje lekciju a učenici slušaju (70%). Postoji statistički značajna razlika među grupama samo u stavkama „nastavnik predaje lekciju, učenici slušaju" i „ekološke sekcije". I jedna i druga se češće koristila kod učenika koji su završili gimnaziju.

Zaključci iz sva tri istraživanja su da program OOR nije široko implementiran, i pored njegove obaveznosti. To naglašava imperativnu potrebu za ponovnom sveobuhvatnom obukom nastavnika svih predmeta u osnovnim i srednjim školama u Crnoj Gori. Pored toga, ključno je pozabaviti se preduslovima za nesmetanu implementaciju: sprovesti kampanju o postojanju OOR, učiniti dostupnom literaturu za implementaciju za svaki predmet, obezbijediti nastavna sredstva za intraktivne nastavne metode i vannastavne aktivnosti, uvesti kabinetsku nastavu u svim osnovnim i srednjim školama, formirati manja odjeljenja (u prosjeku sa 20 učenika), usvojiti nastavne prakse obrazovnih sistema skandinavskih zemalja i integrisati ih u crnogorski obrazovni okvir, poboljšati materijalni status prosvjetnih radnika

u cilju povećanja motivacije za većim zalaganjem u nastavi i oformiti tim u okviru Zavoda za školstvo koji bi kontrolisao implementaciju. Takve mjere bi postavile čvrste temelje za uspješnu implementaciju OOR-a, istovremeno podstičući dublju svijest među učenicima o presudnoj važnosti održivog razvoja za budućnost čovječanstva.

Ključne riječi: obrazovanje za održivi razvoj; nastavnici osnovnih škola; nastavnici srednjih škola; učenici prvog razreda srednje škole; studenti prve godine fakulteta; osnovna škola; gimnazija; srednje stručne škole; ciljevi održivog razvoja;

Naučna oblast: Održivi razvoj

Uža naučna oblast: Obrazovanje za održivi razvoj

UDK broj:

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1. INTRODUCTION

The need for education for sustainable development arises from the recognition that current, often unsustainable human activities result in serious, and even catastrophic, ecological, health, social, and societal problems such as climate change, biodiversity loss, environmental pollution, disease spread, social inequality, and human rights violations. The comprehensiveness of these issues is reflected in resource exploitation, pollution, urbanization, and habitat fragmentation, contributing to climate change, biodiversity loss, and human crises such as uncontrolled migration. This is precisely why the term "Anthropocene" has been established, denoting the latest geological epoch (Steffen et al., 2011).

Life in the Anthropocene represents a challenging paradigm, where people simultaneously play the role of both the cause and the victims of environmental changes. To address these challenges, it is crucial to find sustainable solutions that lead to changes in practices and improvements in the way of life. Solutions that favor sustainability should be based on lifelong education that fosters a comprehensive understanding of environmental issues and motivates individuals to actively participate in problem-solving.

A particular aspect is that Montenegro is declared an ecological state (Parliament of Montenegro, 1991), so it should be especially sensitive to any form of unsustainable practices and further committed to raising awareness among all, particularly younger generations, about the importance of integrated ecological, economic, and social development. Therefore, it is essential to promote education that recognizes the connections between human activities, societal and ecological challenges, encourages critical thinking, and inspires individuals to take concrete steps towards environmental preservation and addressing the burdens of the past, as well as improving lifestyle habits that lead to a sustainable way of living. A comprehensive approach, which includes diverse areas of knowledge, enables the creation of a holistic understanding of problems and provides a foundation for developing sustainable solutions (Ruggerio, 2021).

Elementary and high schools play a key role in the formation of the awareness of children and young people. In addition to providing fundamental education across various subjects, schools have a unique opportunity to influence students' attitudes, values, and

worldviews. Through diverse curricula, activities, and projects, schools can teach young people about various aspects of life, including the importance of lifelong learning, healthy living, mutual respect, understanding diversity, and caring for the environment and society. Therefore, schools must ensure a comprehensive and inclusive approach to education that fosters the development of well-rounded awareness in children and young people, preparing them for active participation in society and the world around them. Integrating sustainability into the school system provides a foundation for developing responsible citizens who are aware of ecological, economic, and social challenges.

In regions as Montenegro, which are characterized by limited research resources, there is a significant lack of foundational studies on the implementation of ESD. The main goal of this dissertation is to address this gap, with a focus on exploring the knowledge and experiences of teachers and students in elementary and high schools regarding ESD, as they are key stakeholders in the educational process.

Since elementary and high school teachers are the most important actors when it comes to introducing, or even sabotaging, innovations or initiatives in education, the primary aim of the study was to answer various research questions related to their experiences and attitudes towards ESD. On the other hand, today's students are the future decision-makers who will bear the burden of future decisions and actions related to sustainability. Therefore, they must be educated in a way that fosters competencies for effective action when the need arises.

It is impossible to be completely certain about the value of the knowledge and skills being taught today in the distant future, but we can be confident that at least some of them will be necessary for addressing severe ecological and social problems. While the specific knowledge and skills taught today may evolve with technological advances and new environmental challenges, the attitude towards sustainable living remains a constant that needs to be nurtured through coordinated efforts of the educational system and other environmentally conscious change agents. Therefore, one of the goals of this doctoral dissertation is to examine the experiences and attitudes of students who have completed elementary and high school regarding ESD.

The unique contribution of this doctoral dissertation is that it is the first research in Montenegro to encompass all eight cross-curricular topics outlined in the ESD program for elementary and high schools (Čabrilo et al., 2014a; Čabrilo et al., 2014b). The findings from this study will offer initial scientific insights into the current state of ESD in Montenegro and provide a valuable evidence base for ongoing enhancements in this field both locally and internationally. By exploring the perspectives and experiences of teachers and students, the research aims to deepen the understanding of the challenges and opportunities associated with implementing sustainable educational practices. Furthermore, the results are expected to inform targeted strategies for improving ESD approaches and ensuring their effectiveness in fostering a sustainable future.

The continuation of the doctoral dissertation will be structured in several chapters: the theoretical part that provides concepts relevant to the research, the research objectives that precisely define the purpose and expected contributions of the work, the methodology that describes the research methods, the instrument and techniques used for data collection and analysis, the results that show the obtained data and findings, a discussion that analyzes and interprets those results in the context of existing knowledge, and conclusions that summarize the main findings and offer proposals for measures to improve the current situation in the examined area.

2. THEORETICAL PART

This chapter presents an overview of the literature that is key to understanding the topic of this research. The focus is on identifying relevant theoretical approaches, empirical research, and critical analysis that are relevant to the concept of sustainable development and education for sustainable development.

2.1. The concept of "sustainable development"

"We hold the future in our hands, together, we must ensure that our grandchildren will not have to ask why we failed to do the right thing and let them suffer the consequences".

UN General Secretary Ban Ki-moon, 2007

Sustainable development is a concept with historical antecedents, extending beyond its formal introduction in the 20th century. Historical records indicate that concerns about environmental issues such as pollution have existed for centuries. For instance, in ancient Rome, there was awareness of the adverse effects of pollution, and similar concerns were evident in Europe, where pollution was linked to disease outbreaks from the late 14th to the mid-16th centuries. Additionally, civilizations in ancient China, India, and Peru practiced techniques for soil conservation as early as 2,000 years ago (Elliott, 2019). This historical perspective reveals a longstanding recognition of the need to balance human activities with environmental stewardship.

Rachel Carson's 1962 book, "Silent Spring," was a significant early work that contributed to modern discussions on sustainability. Carson's critique of the use of pesticides, especially DDT, brought attention to their harmful effects on both the environment and human health. The book led to major policy changes, including the banning of DDT in the U.S. in 1972 and its international restriction by 2004, with exceptions for malaria control.

"Silent Spring" also played a key role in inspiring environmental activism and influencing public attitudes toward scientific progress and environmental protection (Boslaugh, 2016).

Also, the theory that launched a series of ecological movements during the formation of the early concept of sustainable development is the Gaia theory. In the sixties of the twentieth century, James Lovelock introduced the so-called Gaja theory (Lovelock & Margulis, 1974), in which he emphasizes the controversial ecological hypothesis about the Earth as a living organism. The author describes the biosphere as an envelope of living matter and views all species and their physical environment as an integrative system. In this way, all living things contribute to the health of the environment, but they can also damage it. According to Lovelock's theory, man is part of a huge living organism and must adapt like all other species, without favoring man as a special living being. Looking at the planet as an organism of which we are a part, and not as its superior owners, can allow us to last longer and is the only way to survival. The peculiarity of this theory lies in the fact that it encouraged the idea of mutual connection and dependence of all living beings, so we can conclude that Lovelock's systemic approach and holistic view are the essence of the modern concept of sustainability.

Furthermore, a signal of global awakening to ecological awareness can be recognized with the first celebration of Earth Day on April 22, 1970 (US EPA, 2019), which was a pivotal event that drew public attention and encouraged people to think about the impact of human activities on the environment. Even at that time, people were becoming increasingly aware of serious issues such as air and water pollution, deforestation, loss of biodiversity, and overall unsustainable lifestyles. The heightened concern for environmental preservation spurred the first initiatives toward the inclusion of environmental education in formal and informal curricula.

The United Nations Conference on the Human Environment in Stockholm in 1972 (UNEP, 1972) was the first global gathering to prioritize environmental issues. This conference resulted in the adoption of several key documents, including the Stockholm Declaration, the Action Plan for the Environment, and multiple resolutions. The Stockholm Declaration, with its 26 principles, highlighted the importance of environmental issues on the international stage and initiated a conversation between industrialized and developing

countries regarding the necessity of integrating economic, ecological, and social development globally.

The term "sustainable development" first appeared in literature in the book "The Sustainable Society: Implications for Limited Growth" (Pirages, 1977). The concept, complex and open to various interpretations, has led to numerous definitions over the years. The process of defining sustainable development began in the 1970s and resulted in over a hundred definitions. It was formally defined in the 1987 report "Our Common Future" (Brundtland, 1987, p. 41) as "development that meets the needs of present generations without compromising the ability of future generations to meet their own needs."Bonett (2002) emphasizes that sustainability is a key foundation of the mental framework. He argues that the essence of this understanding of sustainability stems directly from a correct attitude towards nature, which significantly affects our attitudes towards the environment and shapes our identity. Kirn (2002) additionally points out that the paradigm of sustainable development came into focus in the 90s of the 20th century as a leading development-ecological vision. It is considered a necessary way out of the environmental crisis that arose from industrial society. Kirn suggests that solving environmental problems may be the key to solving social problems as well since environmental problems are not only environmental issues but also issues that directly affect people. This perspective emphasizes that the preservation of the environment is crucial for human well-being, pointing to the inextricable connection between ecology and society. It also emphasizes that solving environmental challenges not only preserves nature, but also contributes to improving people's quality of life, preserving resources for future generations, and shaping an identity that values the balance between human needs and nature conservation.

The modern concept of sustainable development (Lay, 2007) appeared in the last decades of the 20th century as a set of ideas that should help design and solve the general problem of the disturbed balance between constant material growth, the survival of the environment, the survival of people and living cultures. In that context, sustainability appears as a basic development criterion, emphasizing that there is a constant conceptual and practical tension between sustainability.

Sustainable development has become prominent in academic, management, planning, and intervention contexts, attracting considerable attention. A wide range of actors, both governments and non-governmental organizations, have accepted sustainable development as a relevant development paradigm. The reason for this is that most supporters of this paradigm agree that the challenges facing humanity today (climate change, ozone depletion, water scarcity, loss of biodiversity, inequality, insecurity, hunger, social exclusion, and poverty) can be solved by adhering to the principles and principles of sustainable development (Mensah&Casadevall, 2019).

Thus, over time, the concept has gradually evolved, adopting integrative approaches that interpret it as futuristic and include multidimensionality. Contemporary definitions encompass the complexity of sustainable development, taking into account social, economic, environmental, and cultural aspects. Sustainable development is now seen as a process that goes beyond the balance between economic profit and environmental preservation, including social justice and cultural integrity. The goal of sustainable development has become more comprehensive and universal, changing from single-factor goals focusing on environmental sustainability to the Sustainable Development Goals (SDGs) today. Despite the variety of interpretations, the key essence remains in the preservation of resources for current and future generations, ensuring the harmonious coexistence of people, the planet, and the economy (Shi L. et al., 2019). However, a lack of deeper understanding of sustainable development is still evident among academia, government institutions, and the private sector (Baumgartner, 2011; Broman & Robèrt, 2017).

2.2. Chronological review of international acts key to Education for Sustainable Development

Viewed chronologically, the following international acts follow the development of sustainable development education over time.

1. "Our Common Future," also known as the Brundtland Report, introduces the concept of sustainable development, defining it as "development that meets the needs of present generations without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, p. 41).
2. "Environmental education" is associated with the Stockholm Declaration (UNEP, 1972), adopted at the United Nations Conference on the Environment in Stockholm in 1972. This led to the creation of the United Nations Environment Program (UNEP), established to coordinate global efforts in promoting sustainability and environmental protection. Although the declaration does not focus directly on education, it laid the groundwork for the concept of sustainable development and highlighted the need to balance economic well-being, social justice, and environmental protection.
3. The Belgrade Charter (Belgrade Charter, 1975) emphasized that the environment should be studied as a whole (ecological, political, economic, technological, social, legislative, and cultural aspects) and that environmental education must be interdisciplinary in its approach.
4. Agenda 21, originating from the United Nations Conference on Environment and Development in Rio de Janeiro (UN, 1992), outlines in chapters 36, 37, and 39 the guidelines for mandating states to integrate sustainable development into educational policies.
5. The European strategy for sustainable development (Commission of the European Communities, 2001), within the same context of global initiatives, emphasizes the importance of education for sustainable development as a crucial factor in achieving sustainability at the European level.
6. The World Summit on Sustainable Development in Johannesburg, also known as Rio+10 (UN, 2002), aimed to evaluate the progress made since the 1992 Rio Conference on Environment and Development. This summit reaffirmed commitments to sustainable development principles, addressing critical issues such as poverty, environmental protection, and social justice. Regarding ESD, the Johannesburg Summit stressed the significance of incorporating ESD into national

policies and practices worldwide. The Johannesburg Declaration, adopted during the summit, underscored the necessity of enhancing education and promoting sustainable development as fundamental components of global initiatives to create a sustainable society.

7. The UNECE Education Strategy for Sustainable Development (UN, 2005) points out that the role of educators is central to the implementation of ESD and requires interventions at the beginning, in the pre-employment phase, as well as opportunities for lifelong learning. The training of educators is considered key to improving ESD and encourages member states to: stimulate the development of staff competencies in the education system, including issues related to sustainable development in training and retraining programs for educators for all levels of education, as well as encourage educators to exchange of experiences.
8. Resolution 57/254 of the UN General Assembly (UNESCO, 2021b), was adopted on December 20, 2002, which formally launched the Decade of Education for Sustainable Development. This resolution called on UN member states to support the initiative and take action to integrate sustainable development education into their national education programs. She also called for cooperation with international organizations, civil society, and other relevant actors to support activities during the Decade.
9. The UNESCO World Conference on ESD (UNESCO, 2009), held in Bonn, lays a solid foundation for the importance of education in the context of sustainable development, confirming the importance of education for the promotion of sustainability in schools, higher education institutions and local communities.
10. Agenda 2030 (UN, 2015) comprises 17 primary SDGs and 169 associated targets. These goals address a variety of critical issues, such as combating poverty, guaranteeing access to education, promoting gender equality, protecting the environment, enhancing peace and justice, reducing inequality, and more. Adopted within the framework of the 2030 Agenda, the SDGs establish broad objectives, with Goal 4 specifically highlighting the necessity of providing quality education for all, including education for sustainable development.

11. The Strategic Framework for Education for Sustainable Development (UNESCO, 2019) serves as a guide to Member States for the development and implementation of education for sustainable development policies, emphasizing the need for constant program adaptation to reflect the latest knowledge and challenges.
12. "Education for Sustainable Development: A Roadmap" (UNESCO, 2020) highlights two key priority areas. First, in priority action area 3, the document focuses on building the capacity of educators, emphasizing the empowerment of their knowledge, skills, values, and attitudes regarding sustainability. This approach recognizes the key role of educators in transferring knowledge and shaping the perspectives of young generations. Second, in priority action area 4, the document recognizes young people as key actors in addressing sustainability challenges and related decision-making processes. Young people are seen as key bearers of change and creators of innovation. This area encourages the inclusive participation of young people in decision-making to integrate their perspectives, ideas, and energy into sustainable development strategies. Both priority areas together create synergy between educators and youth, establishing a holistic approach to education for sustainable development.
13. The Berlin Declaration on Education for Sustainable Development (UNESCO, 2021a) highlights the essential role of education in shifting awareness post-COVID-19. It underscores that ESD, which is central to SDG 4.7, forms the foundation for necessary transformation. ESD is recognized as a catalyst for achieving all 17 Sustainable Development Goals, providing the essential knowledge, skills, values, and attitudes for individuals to become proponents of sustainable development.
14. European Declaration on Global Education by 2050. (UNESCO, 2022), known as the Dublin Declaration, emphasizes the need to ensure that overall education (formal, non-formal, informal, lifelong) should include learning for social justice, at the local and global level, as well as human rights, gender equality, diversity, sustainability, and peace.
15. The political declaration adopted at the Summit on Sustainable Development in New York 2023 (UN, 2023a) indicates a serious concern about the threat to the

achievement of SDGs according to the 2030 Agenda. It emphasizes the urgent need to take effective measures to re-establish and accelerate progress towards the SDGs, with a special emphasis on strengthening international solidarity, restoring trust and jointly responding to global challenges (UN, 2023b).

Recent research indicates that despite global awareness and efforts to achieve the SDGs, many of these targets are unlikely to be met by the 2030 deadline (Weitz et al., 2023). Creating a sustainable future remains a fundamental goal for humanity (Sachs, 2012). However, various factors have impeded progress towards the SDGs, and the COVID-19 pandemic has exacerbated the situation, with "years or even decades of progress being halted or reversed" (UN, 2021, p. 3). To fulfill the moral imperatives of the SDGs, which include meeting human needs, ensuring social equity, and respecting environmental limits (Holden et al., 2016, p. 213), substantial and transformative efforts are required across all sectors of human activity (Sachs et al., 2019).

2.3. Education for sustainable development

ESD arose from the need to promote the understanding of sustainability and its application in all spheres of society. The development of this concept is related to the growing global concern for environmental, economic, and social challenges that humanity faces, such as climate change, degradation of natural resources, poverty, inequality, and other problems.

ESD plays a key role in raising people's awareness of issues such as environmental protection, social justice, economic stability, and global cooperation. It provides people with the knowledge, skills, and values necessary to make informed decisions and engage in sustainable practices. It promotes the understanding of interconnections and interdependencies among people worldwide, fostering solidarity and cooperation on a global level. It encourages changes in behavior and practices to create a society capable of meeting its needs without compromising the ability of future generations to meet theirs. ESD promotes an interdisciplinary approach that integrates the ecological, economic, and social dimensions of sustainability.

The world trend is that ESD is developed at all levels of education, from preschool to higher education, and includes formal, non-formal, and informal education. ESD must be integrated into the curriculum and teaching plans to ensure that the principles of sustainable development are transmitted to all generations and sectors of society. It refers to the following literature.

Education plays a dual role in advancing SDGs. On one hand, education itself is an integral goal within the SDGs (UN, 2015). On the other hand, it is also a vital tool for achieving other SDGs by providing individuals with the necessary knowledge, skills, and values to promote sustainability (Kopnina, 2020). Additionally, education helps frame human activities within an environmentally sustainable and socially responsible context (Pogge, 2004). ESD aims to provide learners with the understanding and competencies needed to contribute to a more sustainable and equitable world. This approach emphasizes the interconnectedness of environmental, social, and economic factors, seeking to create balanced solutions that address these dimensions holistically (UNESCO, 2005).

Beyond mere awareness, environmental literacy encompasses a broader set of elements including motivation, knowledge, skills, and behavioral practices. It integrates five key components: knowledge, awareness, behavior, involvement, and attitude (Jannah et al., 2013; Partanen-Hertell et al., 1999). Porch's model of sustainable development in schools (Porsh, 1999) is based on a complex multidimensional approach. Similarly, Mayer's model (Mayer, 2002) describes sustainability in the context of the school environment. It designates sustainability in schools as encompassing pedagogical, organizational, and communicative aspects, sustainability of school facilities, and school management. Pedagogical sustainability is highlighted as key, covering aspects such as curriculum, teaching methods, and school atmosphere. It signifies that one of the most important elements of implementing sustainability is the school curriculum, as well as emphasizing action-based and team projects (Anđić, 2010).

The first decade of the 21st century was marked by numerous achievements, raising environmental awareness, optimism, and innovations. These positive trends were mixed with the impact of constant growth of human systems, population growth, increased global

inequality, fundamental failures of economic systems, and worsening global environmental trends (Ramos et al., 2018).

Sustainable development can be viewed through three dimensions (pillars): environment, economy, and society (Berglund & Gericke, 2016; UN, 2015). These three pillars of sustainability are indeed a key component of Sustainable Development Goal 4 - Quality Education (SDG 4). SDG 4 has seven outcome targets and three implementation methods. Among the SDG4 goals, only goal 4. (Sustainable development and global citizenship) focuses on sustainable development. Because of its importance, we quote it verbatim (The global goals, 2023): "By 2030 ensure all learners acquire 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 culture's contribution to sustainable development".

Environmental education is increasingly becoming education for the future, education for awareness of change (Sterling, 2001), within the vision of society and education that considers changes and attention to social and ecological emergencies as key to its development and that recognizes that the planet, the environment, society, and humanity can only continue to live through change, evolution, to take into account the resulting situations. Recognizing that education is an important tool for promoting sustainability, a goal of humanity reflected in the Sustainable Development Goals (UN, 2015), we can attribute two main goals to education systems and institutions that work within the system. The first is to bring young people closer to the environment (material, social, cultural, and economic) that surrounds them. The reason is that only understanding planet Earth as an ecosystem in which all its components are interconnected can lead to informed solutions that lead to sustainability. Applying solutions that target local problems caused by global, unsustainable practices can only be seen as curative. Preventive measures, which address the root causes of environmental issues, are often deferred despite being recognized. This delay highlights the second primary goal of education: cultivating the ability to effect change. Understanding the Anthropocene is crucial for developing effective strategies and practices to mitigate the adverse effects of human activities. This understanding emphasizes the need for informed and responsible

decision-making to achieve sustainability and poses a significant challenge for humanity (Folke et al., 2021, p. 834).

In a report after ten years of the Decade of Education for Sustainable Development (UNECE, 2016), most member states report that ESD is included as part of initial training, but it is noted that it is not clear where all teacher education institutions have fully integrated this topic. Additionally, the number of teachers who have undergone training in ESD remains unknown. Member States have tried to estimate this percentage, but only a few indicate that more than 75% of teachers are trained in ESD, while most report less than 25% of teachers are trained. In particular, the lack of knowledge about ESD principles and the lack of ESD competencies among teachers were highlighted as a constant challenge in member states such as Canada, Cyprus, the Czech Republic, Malta, and Norway. It is emphasized that efforts to solve the problem of teacher education continue. France, Georgia, and Sweden stand out as examples of good practice. In France, ESD is incorporated as an interdisciplinary theme in the training plans of all education academies, as a result of the 2013 School Reform Act, which introduces environmental education into the Education Code. Georgia has adopted a new professional standard for teachers that includes sustainable development, while Sweden has set new requirements for teacher education related to ESD competencies. In Switzerland, the ESD group within the Swiss Rectors' Conference carried out an assessment of existing practices, methods and content of teacher education courses, preparing recommended guidelines for the integration of ESD into teacher education. Austrian teacher training colleges cooperate with a network of eco-schools. Despite this, the report indicates that in many teacher education institutions, ESD is still offered as an elective or seminar topic, rather than as an integrative principle.

Recent evaluations indicate that while the SDGs have had a significant impact, many challenges remain. Research highlights that the SDGs have effectively raised global awareness, with a 2019 survey by the World Economic Forum showing that almost two-thirds of respondents in 28 countries were aware of these goals (World Economic Forum, 2019). Nonetheless, achieving the SDGs by 2030 faces substantial obstacles.

Initial progress was evident in areas like reducing child mortality and extreme poverty and improving access to electricity. However, global disruptions—such as geopolitical tensions, the COVID-19 pandemic, climate change, and conflicts like the one in Ukraine—have severely affected these advancements. Current projections suggest that only about 12% of the SDGs will be fully realized by the target year, with around 30% showing no progress or deterioration. Extreme poverty is expected to persist, impacting an estimated 575 million people by 2030. Furthermore, the goal of limiting global warming to 1.5°C appears increasingly unlikely to be met, and gender inequality is projected to continue for another 286 years. The pandemic has exacerbated disparities in education, highlighting significant gaps related to income, living standards, and geographic location. Despite these setbacks, it is crucial to persist in the pursuit of the SDGs. Understanding the reasons behind the current challenges is essential for refining strategies and intensifying efforts to meet the sustainability targets for 2030 and beyond (World Economic Forum, 2019).

Sustainable development can be understood from various perspectives, all aiming to balance current needs with those of future generations (Haubrich, 2007). Implementing sustainable development in education has been explored through diverse approaches across different educational levels. Some methods include integrating school gardens or ecological gardens (Tal & Morag, 2017), incorporating storytelling techniques (Nerantzaki, 2016), and assessing students' sustainability competencies (Waltner et al., 2019).

Other strategies involve applying systems thinking through participatory methods (Kioupi & Voulvoulis, 2020), engaging in active learning activities related to recycling (Buil et al., 2019), utilizing educational games (Gandini et al., 2019), and promoting extracurricular activities that encourage reflective learning (Diaz-Iso et al., 2019). Additionally, the adoption of flipped classroom models (Buil-Fabregá et al., 2019), designing effective learning environments (Sinakou et al., 2019), and fostering students' action competence (Chen & Liu, 2020) have also been explored as methods to enhance sustainability education.

To effectively respond to the urgent global need for sustainability (Meadows, 2014), it is imperative not only to advance policies, technologies, and practices but also to prioritize the education of individuals. This educational effort should extend beyond the mere accumulation of environmental knowledge. It should also focus on fostering action

competence, as a key catalyst for meaningful change (Jensen & Schnack, 2006; Arbuthnott, 2009; UN, 2015). Although adults may have significant decision-making power, it is crucial not to underestimate the influence of children who have recently entered elementary and high schools on the acceptance of global sustainable and environmentally friendly practices, as exemplified by figures such as Greta Tunberg (Samuelsson & Kaga 2008).

The pursuit of a sustainable future requires coordinated actions at all levels, as well as transformative changes across various domains of human endeavor, with education playing a key role. The United Nations emphasizes quality education as one of the 17 SDGs (UN 2015), highlighting its potential to prepare future professionals who will innovate for a better world in which economic, social, and environmental aspects coexist harmoniously (Sivapalan 2016; Guerra 2017; Sandri et al., 2018; Svanström et al., 2018; UNESCO 2017; Kopnina 2020; Pogge 2004; Brundtland 1987; Camioto et al., 2017; Gbededo et al., 2018; Leal Filho et al., 2018; Hattie, 2003; Priestley et al., 2013; Biesta et al., 2015). However, despite decades of commitment, the implementation of environmental education, sustainability education, and educational frameworks that share a common goal remains an ongoing challenge. The realization of the SDGs that encompass this vision remains elusive due to various factors (Vladimirova & Le Blanc, 2016). Even after decades of practice, content, goals, pedagogy, and alternative frameworks with essentially the same meaning are still not fulfilled, and different aspects and solutions are proposed (Annan-Diab & Molinari, 2017; Kopnina, 2020), which do not always reflect objective reality educators, school or community.

2.4. Sustainable Development and Montenegro

If you plan for one year, plant wheat.
If you plan for ten years, plant a fruit tree.
If you plan for your whole life - teach and educate people.
Chinese proverb

With the adoption of **the Declaration on Montenegro as an Ecological State** on September 20, 1991, in Žabljak (Parliament of Montenegro, 1991), Montenegro became the

first ecological country in the world, and that document was presented the following year at the United Nations Conference on Environmental Protection held in Rio de Janeiro. Politically, there is an articulated awareness of the importance of natural resources and the obligation to preserve them.

Guided by the fact that it has been declared an ecological country, Montenegro is among the pioneers in Southeast Europe in establishing a strategic and institutional framework for sustainable development following the standards of the European Union. Back in 2001, Montenegro created a comprehensive document entitled "Directions of Development of Montenegro as an Ecological State" (Government of Montenegro, 2022), which was a national response to the goals set by Agenda 21.

The National Council for Sustainable Development was established in 2002 (Government of Montenegro, 2013) on the eve of the World Summit on Sustainable Development in Johannesburg as an advisory body to the Government of Montenegro on issues of sustainable development. It is a key strategic body that deals with the management and coordination of activities in the field of sustainable development in Montenegro. It was formed to promote the principles of sustainability in all aspects of society and economy, as well as environmental protection. The Office for Sustainable Development was established at the end of 2005 in cooperation between the Government of Montenegro and the United Nations Development Program (UNDP).

When the National Council for Sustainable Development set the task of adopting the Strategy and Education Program for Sustainable Development at all levels of education in 2005 (UNECE, 2014), it had in mind that without a significantly improved attitude of citizens towards the environment and the precious resources of Montenegro, there will be no possible isolation of the goals of the National Sustainable Development Strategy, as well as the idea of an ecological state.

After the opening of the European perspective for the countries of Southeast Europe, Montenegro achieved significant progress (Government of Montenegro, 2022) in the construction of the national sustainable development policy and the accompanying institutional framework. In 2007, the government adopted the first **National Strategy for Sustainable Development of Montenegro** (NSOR) **for the period from 2007 to 2012**. This

strategy incorporated key principles from national and European documents, and relied on the globally accepted principles of sustainable development defined in the Rio Declaration, Agenda 21, the Johannesburg Declaration and Implementation Plan, as well as the principles and goals of the UN Millennium Declaration. NSOR has set the sustainable development of Montenegro on the foundations of three pillars of sustainable development: economic, social development, environmental protection, and natural resources, with an appropriate development vision defined for each pillar. In addition to the basic visions, NSOR also includes an ethical dimension (transition from a centralized way of decision-making to negotiations, cooperation, coordinated action and decentralization, and respect for human rights through the reaffirmation of the right to development in a healthy and just environment) and a cultural dimension (the necessity of preserving cultural diversity and identity).

In Montenegro, during the preparation of the National Sustainable Development Strategy of Montenegro, the education sector was recognized through two priority goals:

- Achieving quality education for all children;
- Increasing the thematic content of sustainable development in educational programs from preschool to university level.

With this goal in mind, the Ministry of Education created **an Action Plan for the integration of sustainable development into the education system for the period from 2007-2009.** The goal of the Action Plan (Government of Montenegro, 2007) is to create conditions for the planned introduction of sustainable development content into our education system. As part of this action plan, planning, defining, and connecting the activities of educational institutions for the implementation of sustainable development in the education system in the next three-year period were carried out. It defines the tasks, roles, dynamics, and necessary financial resources of the educational institutions responsible for the implementation of the planned activities. The action plan is aligned with the principles and goals of the UN Strategy, the National Sustainable Development Strategy, and key documents for the implementation of the education reform. It was pointed out that in a time of rapid social changes, it is important to develop an awareness of the importance of the concept of sustainable development at all levels of education.

The new educational programs of elementary, high vocational schools and gymnasiums entail the acquisition of knowledge, skills and competencies aimed at achieving important economic, social, and environmental goals. Their implementation took place following the dynamics of the reform plan. In the 2004/05 school year, 20 elementary schools were included in the reform; in the 2005/06 school year, 27 schools; in the 2006/07 school year, 28 schools; and in the 2007/08 school year, 44 elementary schools were covered by the reform. By the end of the 2013/14 school year, all schoolbooks from grades I-IX were included in the new reformed programs. To increase the thematic content of sustainable development in educational programs, the Institute for Education and the Center for Vocational Education conducted a review of reformed subject programs (Government of Montenegro, 2007) from preschool to university level of education. The contents of sustainable development are highlighted through operational goals for a given teaching topic, activities that accompany the teaching topic, and terms that are dealt with in the corresponding topics are also given. At the end of the analysis of each subject program, an assessment of the content related to sustainable development was made. The nine-year elementary school plan includes ten days for culture, sports, technology, and school-in-nature as part of the mandatory activities. It involves the possibility of organizing lessons outside the classroom, in natural settings or institutions such as museums, galleries, archives, and libraries. It was pointed out that the realization of the program is not possible in a high-quality way without trained teachers and adequate teaching aids. The new subject programs are significantly different from the previous ones. While the old ones prescribed the content that children should learn, the new programs set the outcomes that students should achieve. Also, they propose certain activities that enable the active acquisition of knowledge, which is the assumption that the acquired knowledge is applicable, high-quality, and permanent (Government of Montenegro, 2007).

At the midpoint of the Decade of ESD, **the "Green Package" project** (Regional Center for the Environment, 2009) was presented by the Ministry of Education and Science in the Government of Montenegro in 2009 as an innovative model for bringing global environmental issues closer to young people. It was intended primarily for teachers and students in elementary schools, but it could also be applied to other educational levels. The

teacher's guide is divided into five chapters with focus on environmental protection and sustainable development.

Communication Strategy for Sustainable Development of Montenegro 2011-2013 defines key actors in the process, internal models of communication, as well as appropriate mechanisms to measure the success of its implementation. This document (Government of Montenegro, 2013), based on an assessment of the existing situation and practices in the field of public advocacy for sustainable development, offers specific goals and developed messages for different target groups. For the education sector, the goals are to support efforts to increase knowledge and expertise on sustainable development in educational institutions, promote understanding of the concept through various educational formats, and connect lifelong learning with sustainability.

The team of the Regional Center for the Environment for Central and Eastern Europe, in cooperation with domestic experts in the field of education and ecology, developed the **"Green Package Junior"** (Caković et al., 2013) intended for students from the first to the fifth grade of elementary school. It is anticipated to be a challenge for teachers, students, and their parents, to contribute to the better construction of a sustainable society. The main educational materials include a teacher's guidebook and an interactive DVD edition, which are interconnected and intended for parallel use both in the classroom and for extracurricular activities. The guidebook for teachers is divided into 12 topics: everything around us is connected; resources; atmosphere; population; water; consumption and waste; land; climate change; energy; healthy way of living; biodiversity; development of society and the environment.

The Institute for Education of Montenegro joined the Foundation for Environmental Education (FEE) in 2016 (Government of Montenegro, 2016) and has since successfully implemented the **Eco-Schools program** in Montenegro, which now includes 95 educational institutions. Of these, 41 have successfully met all criteria and earned the international Eco-Schools recognition.

In 2016, the government adopted the **National Sustainable Development Strategy until 2030** (NSOR 2030), which adapted the global sustainable development goals to national frameworks. It highlights education as a key prerequisite for sustainable development, which

means that education is of vital importance for achieving goals such as the development of a green economy, improving environmental protection, reducing poverty and social exclusion, as well as achieving sustainable development in general (Đurović et al., 2016). The strategy emphasizes the need for a quality education policy designed from the point of view of the economy and efficient use of resources. The modern approach to education is based on the principle of lifelong learning and a society that is constantly learning. For this reason, lifelong learning has a key role in the development of the individual and the improvement of the economic potential of the country. This strategy implies continuous support for education through all stages of an individual's life, from early childhood to old age. In addition to traditional formal education, it is important to support informal and non-formal learning methods to ensure that people acquire the necessary knowledge, skills, and competencies throughout their lives.

From the 2017/2018 school year teaching in elementary school is conducted according to new subject programs. The basic determinations that characterize them are a uniform structure of subject programs, defined outcomes, as well as methods and criteria for evaluating outcomes and correlations with other subjects and cross-curricular topics. The teaching objectives of the subjects are defined as cognitive (what knowledge will be acquired) and processual (what skills and values will be acquired). The subject goals are organized into four groups: cognitive skills, digital competencies, social skills, and a responsible attitude toward oneself and the environment (Nikolić et al., 2019). Also, teaching has been carried out according to the reformed number of classes, which has been changed for several subjects, where the most important thing to point out is the reduction of the weekly classes fund for Biology, as one of the key subjects for the implementation of content on sustainable development.

All of the above demonstrates the efforts made to incorporate content into the Montenegrin educational system that will develop students' awareness of the importance of a lifestyle aligned with sustainable development. One of the questions this doctoral dissertation aims to address is the extent to which these efforts have effectively brought sustainable development into practice in elementary and high schools in Montenegro.

2.5. The structure of the Montenegrin education system

Education in Montenegro is guided by programs established by the Ministry of Education, with input from the National Education Council. The Montenegrin educational system encompasses various levels: preschool, elementary, lower secondary, general secondary, vocational secondary, higher secondary, and higher education. Adult education is integrated into the overall system and is available at all educational levels. Preschool education includes nurseries for children up to 3 years old and kindergartens for children aged 3 to 6, organized into age-appropriate groups. Preschool education is not a prerequisite for enrollment in elementary school. Elementary education is compulsory and free for all children aged 6 to 15 years. It spans nine years and is divided into three cycles (Euridice, 2023a). Public primary education is delivered through a network of 162 primary schools, two educational centers, and three support centers. Additionally, four private primary schools are licensed to operate. Secondary education in Montenegro is provided by 53 schools. General secondary education takes place in gymnasiums and mixed secondary schools. Gymnasiums, which can be attended by individuals who have completed elementary education and are under 17 years old, last for four years. Vocational secondary education is offered in high vocational schools and mixed secondary schools, with programs ranging from two to four years. There are also high art schools. Higher education is offered at the University of Montenegro, a public institution, as well as three private universities and two individual private faculties. Since the 2017/2018 academic year, higher education studies are organized according to the 3 (Bachelor) + 2 (Master) + 3 (Doctoral) model. Bachelor studies at the University of Montenegro are free of charge, and from the 2020/2021 academic year, master's studies under the reformed model have also been free at the University of Montenegro (Euridice, 2023b).

2.6. Formal introduction of the Cross-curricular program - Education for sustainable development in the Montenegrin education system

According to Heberlein (2012), three levels should be considered for solving environmental problems:

a) technological level (finding and development of new and replacement technologies and processes);

b) systemic level (setting goals and creating legal and institutional infrastructure);

c) cognitive level (transmitting knowledge, skills, and attitudes to professionals and the public).

Applied to the Montenegrin education sector, formal elementary and high environmental education has adequately incorporated technological and systemic aspects. Montenegro boasts a network of public schools, and the curriculum integrates the principles of ESD. However, achieving optimal integration of ESD into everyday pedagogical practices remains a goal marked by gaps that require investigation from a cognitive perspective focused on both teachers and students – a gap that this study aims to address. The Cross-curricular program ESD has been integrated into the education system since 2014 (Čabrilo et al., 2014a, b). However, the introduction and scope of the implementation of the Cross-curricular ESD program in Montenegro in everyday school life from the perspective of teachers and students has not been the subject of research until now.

The development perspectives of environmental education in schools do not depend only on objective changes in programs and environmental orientation (Grbović, 2010), but other important elements in the process of environmental education are also necessary. It is important to give appropriate importance to environmental content, to recognize the goals of the program with an environmental component and to adequately implement them. Also, it is crucial to incorporate environmental content into the open program and to establish a correlation between teaching subjects in the teaching process, taking into account the experiences and knowledge of students. This implementation depends to a considerable extent on the affinity and training of teachers.

The reason for conducting the study was the recognition that teachers are the main actors of any change (Hattie, 2003; Priestley et al., 2013) and that their work is greatly shaped by their convictions (Biesta et al., 2015; Ajzen, 1991; Abd- Mutalib et al., 2023; Fielding et al., 2008). Another impetus was the regional knowledge that even if there is a curriculum that includes environmental topics, it is not enough to implement it in the classroom (Šorgo&Kamenšek, 2012).

The Institute for Education of Montenegro and the Regional Center for the Environment formed a team with the task of training as many educators as possible in elementary and high schools in Montenegro on the topic of ESD. The target group was all principals, assistant principals, pedagogues, and 20% of teachers of various professions, who held these positions in the period 2012-2014. The principals of the schools who attended the mentioned training were obliged to present the adopted guidelines to the Teachers' Council, to emphasize the obligation to integrate these important contents into all subject programs, as well as to distribute the acquired material that was given to them during the workshops (material on CD, brochures, written material, didactic proposals, examples from practice...). Educators and deputy directors were obliged to monitor the implementation of ESD in the curricula, as well as in the teaching process, which they have an insight into during mandatory teaching visits. Teachers of various profiles who participated in the workshops had the task of disseminating the contents of the workshops to other colleagues in their schools (through the Professional Active meetings). As feedback on the success of the series of trainings, the team that implemented them gave all participants the task that each teacher should hold a class that includes ESD and send the scenarios of the teaching units to the Institute for Education.

It can be officially said that the ESD program in elementary schools in Montenegro has formally existed since 2014. At the 27th session held on March 17, 2014, the National Council for Education established a key initiative called "Education for sustainable development - cross-curricular area" within the subject programs for Montenegrin nine-year elementary school. Montenegro is a member of the UNECE region, so the provisions of the UNECE Strategy for Education for Sustainable Development (UNECE, 2005) were the starting point for the introduction of ESD into the education system. They are based on the guidelines for the implementation of the Decade of ESD (UNESCO, 2005), and served to develop sectoral policies and procedures that will contribute to the integration of sustainable development into the educational process, with the full participation of all teachers.

As a prerequisite for inclusion in the curriculum, it was taken that education for sustainable development is inherently multidisciplinary (Čabrilo et al., 2014a, b), because no subject can comprehensively cover all the essential contents needed to train students with the knowledge and skills necessary for sustainable future. The goals and principles of ESD are

closely related to comprehensive educational goals in Montenegro. They aim to empower students to actively engage and contribute to the social, economic, and environmental development of their local communities, their nation, and the planet as a whole. Although some topics related to sustainable development are already present in general education goals and existing curricula, they are often not explicitly identified as part of the broader discussion on sustainable development, nor is it always clear how they contribute to the concept of sustainability.

To implement the cross-curricular model of ESD, specific topics have been defined that encourage an integrative approach to general education and establish stronger connections between subject areas. This approach promotes the development of key competencies in students. The main focus was on implementation in elementary school because it is mandatory for every child, which is not the case in preschool institutions and general and vocational high schools.

Eight cross-curricular topics were identified in accordance with Montenegrin priorities and tradition (Čabrilo et al., 2014a, b), with consideration of international strategic documents in the field of ESD. These cross-curricular topics include:

1. Climate changes
2. Green economy
3. Environmental protection
4. Sustainable cities and settlements
5. Biodiversity
6. Health education and upbringing
7. Education for and about human rights
8. Entrepreneurial learning

Within the ESD curriculum for elementary school, each topic presents objectives, student activities, time frames, content and indicates the subjects in which these objectives are to be achieved (correlations). As a whole, it can be seen that the correlations include almost all the compulsory subjects that students study during their nine-year education in elementary school.

The second step towards the introduction of ESD in the Montenegrin education system was its introduction into high schools. The inclusion of the content of sustainable development through the curriculum for gymnasium and general education subjects in high vocational schools was made possible by the creation of the cross-curricular area *Education for Sustainable Development*, which was adopted by the National Council for Education at the 32nd session held on March 23, 2015 (Čabrilo et al., 2014b). For high vocational schools, the curriculum is not specifically formalized, but in the training conducted by the Institute of Education, all members of the administrations of those high schools were included, as well as teachers of compulsory subjects who were expected to implement them. The third step was the introduction of ESD in preschool education (age of children 3-6 years) and methodological instructions for its implementation (Čabrilo et al., 2015).

2.7. The results of Montenegro in the previous cycles of PISA testing

In 2006, Montenegro joined the OECD/PISA (Programme for International Student Assessment) and since then has participated in all research cycles. The results of the PISA test are a valuable tool for monitoring, evaluating, and planning the improvement of the quality of educational outcomes. At the same time, they are a significant resource for teacher training, improvement of teaching programs and textbooks, and of course, the creation of educational policies. The implementation of PISA testing is the responsibility of the Examination Center. Previous results of Montenegro in PISA testing show outcomes that are not encouraging (Table 1, 2, 3; Figure 1). They indicate that students lack functional knowledge, meaning they are not successful in applying the knowledge, skills, and abilities acquired through formal and informal education.

On the PISA test from 2012, the average achievement of our students in mathematical competence was 410 points (OECD average is 494 points), which placed Montenegro in 54th place on the list of 65 countries (Table 1). The average achievement in reading competence was 422 points (OECD average is 496), which places us in 53rd place. When it comes to scientific competence, the average achievement of our students was 410 points (OECD

average is 499 points), based on which we ranked 56th in the mentioned list of countries (Ministry of Sustainable Development and Tourism, 2016). The results of the 2015 PISA test rank Montenegro in 59th place out of 70 member states in scientific competence, 53rd in reading competence, and 52nd in mathematical competence.

Table 1: Presentation of the results of Montenegro on PISA testing from 2006-2015

	in 2006			in 2009			in 2012			in 2015			Difference 2015-2006.
	OECD average	CG	place	OECD average	CG	place	average	CG	place	OECD average	CG	place	
Scientific competence	503	412	48.	506	401	55.	505	410	56.	497	411	59.	-1
Reading competence	495	392	50.	499	408	54.	501	422	53.	497	427	53.	+35
Mathematical competence	501	399	50.	502	403	54.	499	410	54.	496	418	52.	+19

(Ministry of Education, 2019; Nikolić et al., 2019; PISA PISA, 2022; Dmitrović (nd); OECD PISA 2006)

The difference compared to the OECD average in 2018 remains very significant (Visser & Kovač-Cerović, 2022), which suggests that students in Montenegro are almost two years behind the OECD average in reading and science, and slightly less so in mathematics (Table 2).

Table 1: Presentation of the results of Montenegro on the PISA test in 2018 and 2022

	in 2018			in 2022		
	OECD average	CG	place	OECD average	CG	place
Scientific competence	493	415	61.	491	403	62.
Reading competence	493	421	52.	482	405	56.
Mathematical competence	496	430	50.	480	406	54.

(OECD.2018, 2022)

The results of Montenegrin students in the 2022 PISA testing (PISA, 2022) are worse than in 2018 and are far below the OECD average. Montenegro ranks 54th in mathematical competence, 56th in reading competence, and 62nd in scientific competence. In mathematical competence, Montenegro scored 430 points in 2018 and 406 points in 2022. The best result in reading competence was achieved in 2015 with 427 points, followed by 421 points in 2018, and 405 points in the most recent assessment. In scientific competence, Montenegro had 415 points in 2018 and now has 403 points. A concerningly high percentage of students have low achievements (Table 3), which is twice the OECD average, while only 1% of students achieve top results, compared to the OECD average of 7%.

Table 2: Achievement levels: the difference between PISA testing 2012 and 2022 (PISA, 2022)

	Mathematics	Reading	Science
Percentage of top achievers (levels 5 and 6)	-0.1	-0.4	-0.1
Percentage of least successful students (below level 2)	+2.9	+9.6	+4.2

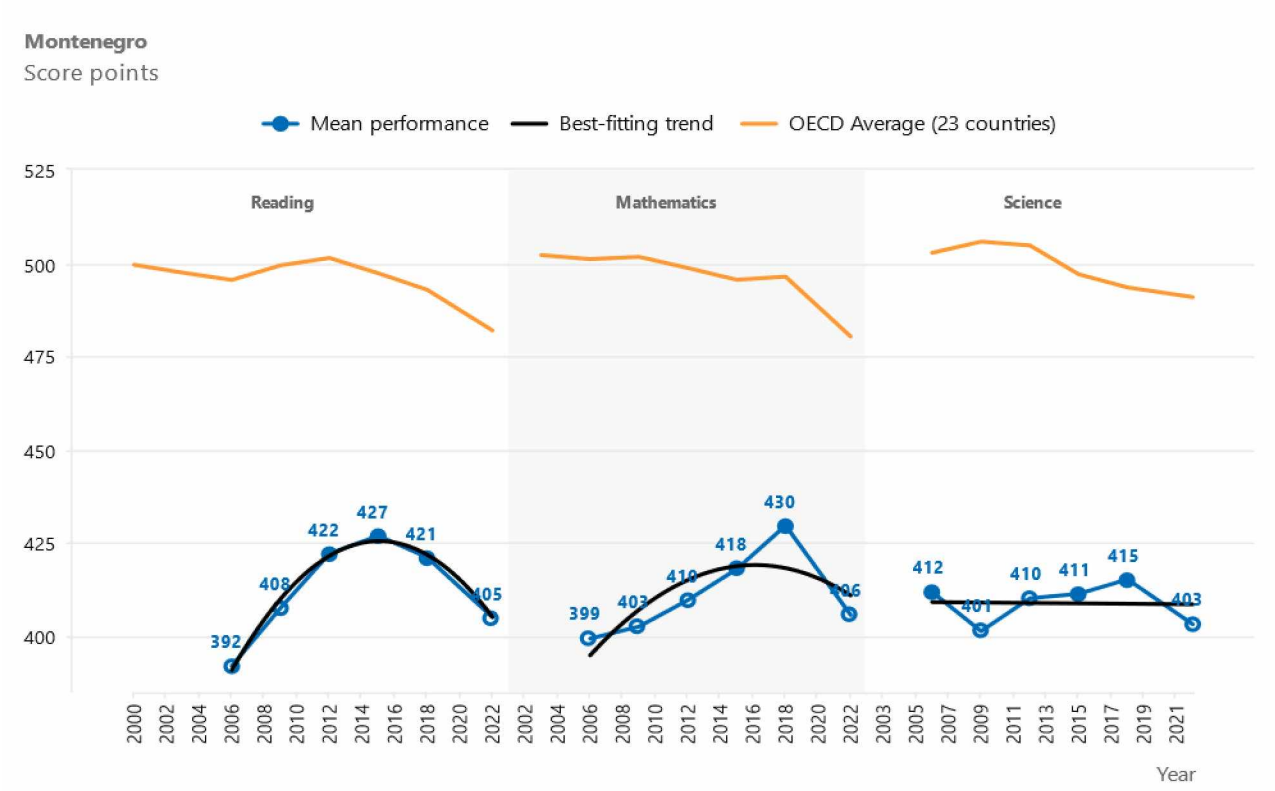


Figure 1: Graphical presentation of the results for Montenegro compared to the OECD average (https://oecdch.art/a40de1dbaf/C910)

Therefore, the main goal of PISA testing is to assess students' abilities in reading, mathematics, and natural sciences. However, PISA also examines other aspects of the educational experience, such as students' motivation to learn, their attitudes toward learning and school, and social and economic factors that may influence educational outcomes. This enables a deeper understanding of the effectiveness of education systems around the world and the identification of areas that require improvement, as well as how these systems cope with changes and challenges in modern society.

Based on the presented individual and comparative results of the PISA test, it is easy to conclude that Montenegrin 15-year-olds in all three tested areas of competence are in the last third of the table. The potential causes of this state of affairs can be discussed from various perspectives, but the opinion of all actors in the educational process must be heard if the state is to be improved.

These results are particularly telling when considering the number of students who have received the prestigious "Luča" diploma, which has been increasing in recent years. According to data from the Ministry of Education (2023), at the end of the academic year 2022/23. in 2008, there were 7,527 active IX grade students, of which 926, or 12.3%, received the Luča diploma. At the end of the school year, there were 4,804 active students in the fourth grade of high school, of which 883, or 18.4%, received the Luča diploma.

In this research, the PISA results and the tendency to increase the number of students with the "Luča" diploma are mentioned exclusively for discussion material after the presented results. The target group in our second research was students of the same age as the subjects for the PISA test. This approach makes it possible to compare the results of this research with the results of PISA testing and consider potential connections. The quality of the education system, including access to resources, teacher training, curricula, and access to learning, can have a major impact on both PISA test results and the understanding and application of sustainable development principles. Connecting these factors can provide a deeper understanding of the relationships between education, sustainable development, and educational outcomes as measured by PISA testing.

2.8. Previous research on ESD in Montenegro

Before the formal introduction of the cross-curricular ESD program into the educational system in Montenegro, Grbović (2010) highlighted that most teachers were inadequately prepared to meet the demands of environmental education. This assessment is based on personal experience with teachers, observations of the current situation, and the fact that many teachers had received insufficient or no training in these topics during their formal education. The lack of professional development through seminars and courses further exacerbates this issue. Extracurricular activities, both within and outside of school, are crucial for enhancing the quality of students' environmental education. These activities are organized through various sections, groups, clubs, societies, and student organizations to engage students actively in their environment. However, Grbović notes that schools are not fully utilizing these activities, particularly in collaboration with local cultural and ecological organizations.

The lack of teacher training and inadequate teaching materials are identified as significant barriers to the effective implementation of environmental education.

Although the goals of sustainable development have long been included in the general objectives of each subject, and the concept of Education for Sustainable Development has been officially in use since 2014, only a few studies have been conducted in Montenegro to date. They did not include all the topics presented in the cross-curricular ESD program, nor did the methodology, population, and sample match the one in the dissertation. For the needs of UNICEF and UNDP in Montenegro, a survey was conducted in which children's knowledge and attitudes about climate change were examined (CEED, 2011). In cooperation with UNDP and the Ministry of Sustainable Development and Tourism, in 2017, two studies on the implementation of climate change as an interdisciplinary topic were realized (CEED, 2017a.; CEED, 2017b). In the same year, an analysis was conducted of the curricula for preschool, elementary, and general high education in the interdisciplinary area of sustainable cities and settlements (Institute for Education, 2017).

2.9. International research on the implementation of ESD

It must be emphasized that the results of this dissertation cannot be directly compared with international studies, because the Montenegrin ESD curriculum is in some ways, unique, although the idea of ESD is integrated into many educational systems (Rauch, 2002). Another problem was that the references that show some similarity mostly state the results of studies at the university level and very rarely at the elementary or high school level (eg Šorgo & Kamenšek, 2012). Even when the populations are matched, the focus is different (Boeve-de Pauw et al., 2015). Not very helpful in categorizing the results is the diversity of school systems, where the years of elementary school before diversification in different directions can be of different lengths, from 4 years (e.g. in the Czech Republic or Germany) to 9 years as in Slovenia or Montenegro (Eurydice, 2023; Eurydice, 2023a; Eurydice, 2023b). Nevertheless, the following are the conclusions of the study that can be related to the context of this dissertation.

Perceptions of obstacles assessed by Ecuadorian teachers (Anderson & Jacobson, 2018) were statistically grouped into three factors: logistical (related to field trips, time, and

money), lack of training and support from the Government, and attitudes (related to students' lack of interest). A study by Hayk&Leòn (2021) identified three main barriers: logistical, educational, and attitudinal, which are often connected to a lack of resources and support from the Ministry of Education. Teachers believe that environmental education is an important part of the comprehensive training that students should receive, but they note that not all teachers share this vision and that there are numerous limitations (not only economic and time but also administrative and institutional support). Other obstacles include a lack of knowledge because few teachers have formal education in environmental education, so apart from the short courses and thematic conferences they have attended, they do not have adequate preparation in this area, but they are willing to be trained if they receive support from their institutions or the government. Also, they believe that environmental education should be part of the curriculum of all subjects, and should not be just a complementary activity that is the sole responsibility of biology and ecology teachers. Ntona et al. (2023) highlight the obstacles faced by high school teachers in Greece in implementing environmental education programs over more than 30 years in the Greek education system. Obstacles are structural, financial, and economic, as well as pedagogical and epistemological. They refer to the position of environmental education in high schools and to the orientation of schools within the general education system. The results of that study indicate the limitations of environmental education in schools, rather than its expansion and development. Carbach&Fischer (2017) present the approach and results of research conducted in three pioneering schools in Germany that have begun to establish sustainability reporting mechanisms. Despite the progress made, there is still a gap in the implementation of education for sustainable development in formal education systems at the school level. The main challenges of the reporting process were identified as high time consumption, high workload for teachers and lack of support for teachers. Anyolo et al. (2018) investigated Namibian school teachers' perceptions of education for sustainable development and teaching practices using a qualitative-exploratory study. The findings showed that upper high school teachers see ESD as acquiring knowledge about the environment for the sustainable use of resources for the benefit of future generations. The study also revealed that teachers have a positive attitude towards the inclusion of ESD in the curriculum. It was suggested that ESD be implemented as an independent subject or

integrated with other existing subjects as a multidisciplinary approach. Efaw (2005) highlights that the integration of technology in the classroom offers numerous benefits, including reducing teacher workload and enhancing student learning, motivation, and acquisition of tools and skills necessary for lifelong learning in a technological age. For this to be effective, teachers need to move beyond traditional teaching methods and embrace technology-enhanced instruction. While traditional approaches may feel more secure and familiar, they may not fully serve our technologically adept students. Efaw (2005) argues that rather than fearing technological advancements, teachers should embrace them and integrate these innovations into their daily teaching practices.

Moore et al. (2019) propose a conceptual model of a triadic partnership between school-based communities of practice, higher education institutions, and local industry. This model aims to provide a sustainable approach in schools and support teachers in integrating ESD principles into the curriculum. In this way, the sustainable competence of both current and future generations is increased. The study by Šorgo&Kamenšek (2012) examines the environmental protection curriculum among Slovenian respondents who have just finished high school (first-year students). The findings show that some students remain uninformed about important environmental issues and that the level of awareness varies depending on the school and the teacher teaching a particular class. Additionally, environmental issues are not addressed through an interdisciplinary or cross-curricular approach, and the dominant teaching method in environmental education remains direct instruction within the classroom. Active methods, which involve full student engagement, are used only occasionally in most cases, and project-based approaches are raraly or never implemented. Boeve-de Pauw et al. (2015) conducted a study that aimed to examine the effectiveness of education for sustainable development in formal education in terms of promoting sustainability awareness among adolescents in Sweden. The results confirm that ESD has the potential to be effective, but also show that there is no universal solution and that educational methods should be specially adapted to the target group. Also, the results confirm the key role that ESD can play in solving the problems of sustainable development and ensuring a sustainable future for future generations.

3. OBJECTIVES OF THE RESEARCH

For the purposes of this doctoral dissertation, three research studies were conducted on different target groups (target group 1. - teachers of elementary and high schools in Montenegro; target group 2. - students of the first grade of high school in all high schools in Montenegro; target group 3 - students of the first year of study at faculties in Montenegro), so the goals, results, conclusions, and discussions of the research are presented for each target group individually. Also, comparative findings will be presented, considering that several similar questions were targeted in the questionnaires, based on which comparison valuable conclusions can be drawn regarding the examination of the subject of this research.

3.1. Research objectives on the experiences and attitudes of elementary and high school teachers (target group 1) on ESD

Since teachers are the most important actors when it comes to introducing or even sabotaging innovations or initiatives in education, the first research aimed to answer several research questions concerning the implementation of ESD in elementary and high schools in Montenegro.

The objectives of the research for elementary and high school teachers in Montenegro (target group 1) were:

1. Establish teachers' familiarity with the ESD;

2. Investigate familiarity with the methodological guidelines for the implementation of ESD;

3. Determine the level of implementation of ESD;

4. Identify the barriers teachers encounter in the process of implementation of ESD;

5. Discover the reasons for (not) integrating ESD into the classroom
6. Examine which teaching topics of ESD are least implemented;

7. Determine which teaching methods teachers most often use when implementing ESD content;

8. Identify which methods are least used in the implementation of ESD content;

9. Assess the interest of teachers in the greater scope of implementation of ESD content in the teaching process.

3.2. Objectives of research on the experiences and attitudes of first-grade high school students (target group 2) on ESD

The second research aimed to, from the experiences and attitudes of first-grade high school students, answer numerous research questions regarding the implementation of ESD during elementary school (target group 2).

The research objectives for target group 2 were:

1. Assess familiarity with teaching content from the ESD curriculum;

2. Determine which teaching topics from ESD are least familiar with;

3. Find out which educational topics of ESD are most familiar with;

4. Determine which teaching methods were most often used by teachers in elementary school during the implementation of ESD content;

5. Identify which methods were most often used by teachers during elementary school during the implementation of ESD content;

6. Assess the interest in a greater scope of implementation of ESD content in the teaching process;

3.3. Research objectives on the experiences and attitudes of students who are in the first year of studies on Education for Sustainable Development

The third research aims to answer questions related to knowledge and attitudes about ESD among Montenegrin students who are transitioning from high school to higher education. This target group was selected to find out how ESD program was implemented in high schools.

The research objectives for target group 3 were:

1. Determine which cross-curricular topic from the ESD curriculum the mentioned students are most familiar with during their high school education;
2. Conclude which cross-curricular topic from the ESD curriculum the mentioned students were least familiar with during their high school education;
3. Assess the interest of first-grade high school students in the greater scope of implementation of ESD content in the teaching process;
4. Identify which subject from high school had the greatest impact on them, when it comes to knowledge related to sustainable development;
5. To examine which subject from high school had the greatest impact on them, when it comes to knowledge related to sustainable development;
6. Investigate whether there is a difference in the experiences and attitudes of first-year students who graduated from gymnasium, and those who attended one of the four-year high vocational schools in Montenegro.

3. 4. Research hypotheses

The assumptions (hypotheses) of the research are:

1. H_1: There are differences in experiences about ESD.

H_{1a}: between elementary and high school teachers in Montenegro;

H_{1b}: between teachers in gymnasium and high vocational schools in Montenegro.

2. H_2: There is a difference in attitudes about ESD.

H_{2a}: between elementary and high school teachers in Montenegro;

H_2b: between teachers in gymnasium and vocational high schools in Montenegro;

H_2c: between students of the first year of study who completed gymnasium, and those who attended one of the four-year high vocational schools;

3. H_3: There is a difference between subjects regarding their influence on students' knowledge of ESD content.
4. H_4: The inclusion of ESD is influenced by available adequate literature that follows the implementation of the learning outcomes prescribed by the ESD program.

4. METHODOLOGY

Methodologically, this research can be described as a non-experimental educational study using a questionnaire as the instrument for data collection from three populations of respondents. To answer research questions about the implementation of education for sustainable development in elementary and high schools in Montenegro, the selected population was teachers of elementary and high schools in Montenegro (group 1), students of the first grade of high school in all high schools in Montenegro) (group 2) and students in the first year of their studies at the faculties in Montenegro (group 3).

In the first stage, data collection involved reviewing sources from the Institute for Education (including the official website, available documentation, and interviews with staff involved in teacher training) and the Institute for Textbooks to assess the availability of literature related to education for sustainable development in Montenegro. Following a detailed analysis of the collected information, three questionnaires (Appendices 1, 2, and 3) were developed. These questionnaires are designed to gather responses that will address the research objectives. The surveying of the selected target groups was then conducted in three phases. In the second stage, the collected data were analyzed using various statistical methods with Jamovi statistical software version 2.3.18 (https://www.jamovi.org).

4.1. Population and sample

According to Monstat data (Monstat, 2022; Monstat 2023), the population of respondents in the 2022/23 school year for target group 1 (elementary and high school teachers in Montenegro) is 7,287 (5183 teachers work at elementary schools, and 2104 at high schools), for target group 2 (students of the first grade of high school in all high schools in Montenegro) is 6,748, for target group 3 (students of the first year of study at faculties in Montenegro) is 6423. To achieve a confidence level of 95% with a statistical error of 5%, the goal during the research was to have a minimum of 400 in each target group of respondents.

Socio-demographic data were not collected in any of the mentioned three surveys, because the interest was in the topics of implementation of the cross-curricular program of ESD, and not in the differences within target groups of teachers and students. This also ensured complete anonymity.

4.1.1. Population and sample for target group 1.

The research population 1. consists of Montenegrin elementary and high school teachers. According to the data of the Ministry of Education of Montenegro (2022), in the school year 2022/23. classes are organized in 168 elementary and 55 high schools. The responses were collected from 1,065 teachers. However, 180 of them (16.9%) did not provide information on whether they work in elementary or high school. Among the teachers who provided details of their affiliation (887), 625 (70%) declared as elementary school teachers, 96 (11%) declared as teachers in high schools, and 166 (19%) as teachers in various vocational high schools.

4.1.2. Population and sample for target group 2.

Research population 2. consisted of students in the first grade of high schools throughout Montenegro. To establish the situation in the area that was chosen as the subject of research (students' familiarity and attitudes about ESD during elementary school), there were two alternatives. The first was to survey ninth-grade elementary school students, and the second was to survey first-grade high school students. It was decided that the second alternative because this approach makes the sample more diverse because classes in high schools are made up of students who have gone through a wider range of schools, who will answer questions about their previous education without hesitation. Another reason for choosing the second alternative is that otherwise the respondents might think that honest answers will have consequences for their grades, and this is how we got fresh and objective information.

A total of 705 students responded, which represents approximately 10% of all first-year high school students in Montenegro. Of these, 71 students partially completed the

questionnaire, while 634 students fully participated in the survey, with some data missing at random. Sociodemographic data were not collected, as the focus was on the curriculum topics rather than differences among students. This also ensured complete anonymity.

4.1.3. Population and sample for the target group 3.

Research population 3. consisted of first-year students at all faculties throughout Montenegro. To examine the situation in the area we chose as the subject of research (students' familiarity and attitudes about ESD during high school), there were two alternatives. The first was a survey of students in the fourth grade of high school, and the second was to be students of the first year of study at all faculties in Montenegro. It was decided to conduct the research among first-year students at all faculties in Montenegro. This alternative provides access to a mixed sample of respondents coming from different high schools, which can provide a broader insight into students' attitudes and experiences regarding ESD during high school. Also, faculty students are more inclined to express their opinions without fear of possible consequences that could result from directly surveying high school students. This contributes to more honest answers and a deeper understanding of students' familiarity, attitudes, and experiences regarding ESD. Answers were collected from 513 first-year students, of which 404 declared which type of high school they attended. This was used in statistical analyses to compare data.

4.1.4. Sampling

It was decided that the examination instrument for all three target groups would be an online questionnaire, created using the application www.1ka.si. This approach allowed for engagement with all target groups included in the study. There are two possible variations from the ideal proportion of random sampling by school. The first possibility is that, for some reason, the survey link did not reach the target group. The second possibility is that the survey link did reach the target group, but the respondents chose not to complete it.

Data collection was implemented in three phases:

First Phase: Data were collected on the familiarity, experiences, and attitudes of teachers from elementary and high schools in Montenegro regarding Education for Sustainable Development (ESD) (target group 1).

Second Phase: A survey was conducted among first-year students at various high schools across Montenegro (target group 2).

Third Phase: A survey was carried out among first-year students at different faculties in Montenegro (target group 3).

All three surveys were conducted anonymously to ensure that respondents provided honest answers, allowing for credible conclusions. The surveys were distributed via links sent to all elementary and high schools, as well as faculties in Montenegro. For teachers, the existing Viber groups used for internal communication within the Teachers' Council facilitated the distribution of the survey link. The research goal was clearly stated, emphasizing that the data collected would be used exclusively for academic purposes and potential future publications. Participants were informed that their involvement was voluntary and anonymous, with the option to withdraw at any time. To increase response rates, two reminders were sent to elementary and high schools and faculties, encouraging them to promote the survey to potential respondents.

- The target group 1 was surveyed, consisting of teachers from all elementary and high schools in Montenegro. Data collection was carried out in the period from June 26 to September 16, 2022, throughout the territory of Montenegro.
- Target group 2 was surveyed, consisting of first-grade students from all high schools in Montenegro. Data collection took place between September 17 and November 17, 2022. Given that the participants in this research are minor students, the opinion of the Ministry of Education of Montenegro was requested, which confirmed that the study can be implemented.
- The target group 3, which consists of first-year students at all faculties in Montenegro, was surveyed. Data collection took place between October 8 and December 20, 2022.

4.2. Research instruments

4.2.1. The instrument used for the target group 1.

The questionnaire for target group 1 consists of 11 questions, 7 of which are multiple-choice and 4 with a scale. The multiple-choice questions aim to find out: how teachers are familiar with the ESD program, the scope of implementation, how familiar they are with the methodological instructions for implementation, what type of school the teachers work in, and how many years they have been working in the school. The complete presentation of the questionnaire can be seen in the Appendices.

Two types of scales were used to obtain teachers' opinions. The first is a seven-point semantic differential scale with bipolar adjectives (Gardner, 1995) (see Table 9), and the second is a seven-point Likert scale with the statements "strongly disagree" and "strongly agree" (Table 11). The first scale was used to assess attitudes towards greater inclusion of sustainable development content, and the second scale was used to assess the reasons that influence the inclusion of this content in their subject. The frequency of including sustainable development content in the classroom and the frequency of using different teaching methods was assessed using a six-point scale with the following statements: 1 – Never; 2 - Very rare; 3 - Rarely; 4 - Sometimes; 5 - Often; and 6 - Very often (Tables 7 and 13).

4.2.2. The instrument used for the target group 2.

To answer research questions about the familiarity, experiences and attitudes of students who have completed elementary school about ESD, a questionnaire consisting of six tables was compiled. The complete presentation of the questionnaire can be seen in the Appendices. The first part of the study intended to investigate familiarity with the contents of cross-curricular topics (CCTs) and the most commonly used teaching methods during elementary school education. The second part of the study was the question of their opinions and attitudes towards teaching practices.

4.2.2.1. The first part of the research: Familiarity of first-grade high school students with ESD content and the most commonly used teaching methods during elementary school education

1. Familiarity with cross-curricular topics (CCTs) during elementary school education (Table 14).

In Table 14, the eight CCTs are listed. Students were asked, "How did you learn about the mentioned topics related to sustainable development?". They were instructed to choose the number that best represented their level of experience. The following six options were offered: (1) This is the first time I heard about this topic in this questionnaire; (2) This topic is only mentioned, but not explained in school; (3) This topic is explained in detail only in biology class; (4) This topic is explained in detail in several subjects; (5) I only heard about this topic in the media; (6) I learned about this topic independently from available literature.

2. Frequencies and measures of central tendencies of including ESD content in elementary school teaching (Table 15).

Table 15 lists the 27 topics contained in the ESD curriculum for elementary school. Students were asked, "How often did elementary school teachers talk about the following topics in one or more subjects?" They were instructed to mark the number corresponding to their frequency. Six options are given: (1) Never; (2) Very rare; (3) Rarely; (4) Sometimes; (5) Often; (6) Very often.

3. Frequencies and measures of central tendencies of using different teaching methods used in elementary school (Table 18, 19).

Table 18 lists fifteen different teaching methods that are used in the implementation of the content on sustainable development. Students were asked to mark the number corresponding to the frequency of using the given methods during elementary school. The following six options were offered: (1) Never; (2) Very rare; (3) Rarely; (4) Sometimes; (5) Often; (6) Very often.

4.2.2.2. Second part: Opinions and attitudes of first-grade students, as well as the impact of different elementary school subjects on ESD knowledge

1. Frequencies and measures of central tendencies of the importance of different subjects in acquiring knowledge about ESD (Table 21).

Table 21 lists eleven compulsory subjects in elementary school, asking students to choose the number on a six-point scale that corresponds to their opinion about the importance of the subjects by answering: "Express the importance of the listed subjects from elementary school when it comes to your knowledge of the importance of coordinated ecological, economic and social development on Earth." The response format of the scale was: (1) Completely unimportant; (2) Fairly unimportant; (3) Slightly important; (4) Moderately important; (5) Important; (6) Very important.

2. Frequencies and measures of the central tendencies of the degree of satisfaction with acquired knowledge about ESD from different subjects in elementary school (Table 24, 25). Table 24 gives a list of eleven compulsory subjects of elementary school and asks the students to choose a number that represents their satisfaction with each subject: "Express the degree of satisfaction with the acquired knowledge from the mentioned subjects, which are related to harmonized ecological, economic and social development." " The format of the response scale was: (1) Completely dissatisfied; (2) Fairly dissatisfied; (3) Slightly satisfied; (4) Moderately satisfied; (5) Satisfied; (6) Very satisfied.

3. Frequencies and measures of central tendencies of attitudes towards greater inclusion of ESD content in teaching (Tables 27, 28).

In Table 27, students were asked about their opinion on the greater inclusion of sustainable development content in teaching, and between them were offered pairs of opposite statements and a scale of numbers from 1-7. Students were asked to indicate which statement their opinion was closer to. Number 1 refers to statements that mean positive attitudes about the contents of sustainable development: Useful; Necessary; Interesting; Easy for teachers to implement; Easy for students to learn; Important for the whole society; Important for students; Important for my further education; Important for future generations; Important for a healthy

environment; Important for human health; Important for survival on Earth. The number 7 implies complete agreement with statements that are contrary to those stated.

4.2.3. The instrument used for the target group 3.

A questionnaire was prepared for answers to research questions about the familiarity, experiences, and attitudes of students who have recently graduated from high school regarding ESD, a questionnaire was designed. The complete presentation of the questionnaire can be seen in the Appendices.

The questionnaire consists of eight tables, of which two questions were not directly related to ESD, but these questions were formulated to ensure sample precision and to enable comparison of data between groups of students, specifically those who have completed gymnasiums versus those who have finished four-year vocational high schools. The first question aimed to specify that it was a student in the first year of study, while the second aimed to examine which high school the respondents had completed. They were offered: high school in Montenegro; Four-year high vocational school in Montenegro; and High school out of the borders of Montenegro.

The examination of the implementation of ESD in high schools is divided into two parts. The purpose of the first part of the study was to investigate the familiarity of first-year students with ESD content and the most commonly used teaching methods during high education. The second part of the study was to examine the opinions and attitudes of first-year students towards ESD, as well as the impact of different high school subjects on ESD knowledge.

4.2.3.1. The first part of the research: Familiarity of students in the first year of study with ESD content and the most commonly used teaching methods during high education

1. Familiarity with cross-curricular topics (CCTs) during high school education (Table 31).

In Table 31, eight cross-curricular themes (CCTs) are mentioned. Students were asked, "How did you learn about the mentioned topics related to sustainable development?". They were instructed to choose the number that best represented their level of experience. The following six options were offered: (1) This is the first time I heard about this topic in this questionnaire; (2) This topic is only mentioned, but not explained in school; (3) This topic is explained in detail only in the Biology class; (4) This topic is explained in detail in several subjects; (5) I only heard about this topic in the media; (6) I learned about this topic independently from available literature.

2. Frequency and measures of the central tendency of including ESD content in high school teaching (Tables 34 and 35).

Tables 34 and 35 list 30 topics contained in the curriculum of education for sustainable development for high school. Students were asked, "How often did high school teachers talk about the following topics in one or more subjects?" They were instructed to mark the number corresponding to their frequency. Six options are given: (1) Never; (2) Very rare; (3) Rarely; (4) Sometimes; (5) Often; (6) Very often.

3. Frequency and measures of the central tendency of the use of different teaching methods that were used in the high school during the implementation of the ESD curriculum (Tables 39 and 40).

In Table 36, fifteen different teaching methods used in the implementation of content related to sustainable development are listed. Students were asked to indicate the number corresponding to the frequency of using the given methods during high school. The following six options were offered: (1) Never; (2) Very rare; (3) Rarely; (4) Sometimes; (5) Often; (6) Very often.

4.2.3.2. Second part: Opinions and attitudes of students in the first year of studies towards ESD, as well as the influence of different subjects from high school on knowledge about ESD

1. Frequency and measures of the central tendency of the importance of different subjects in acquiring knowledge about ESD (tables 44 and 45).

Tables 44 and 45 list eleven compulsory subjects in high school, asking students to select a number on a six-point scale that corresponds to their opinion of the importance of the subject by answering: the importance of coordinated ecological, economic, and social development on Earth." The response format of the scale was: (1) Completely unimportant; (2) Fairly unimportant; (3) Slightly important; (4) Moderately important; (5) Important; (6) Very important.

2. Frequency and measures of the central tendency of the level of satisfaction with acquired knowledge about ESD from different subjects in high school (Table 48).

In Table 48, a list of eleven mandatory high school subjects is presented, and students were asked to select a number representing their level of satisfaction with each subject: "Express your level of satisfaction with the knowledge acquired from the listed subjects, which pertain to aligned ecological, economic, and social development." The response format of the scale was: (1) Completely dissatisfied; (2) Fairly dissatisfied; (3) Slightly satisfied; (4) Moderately satisfied; (5) Satisfied; (6) Very satisfied.

3. Frequency and measures of the central tendency of attitudes towards greater inclusion of ESD content in teaching (Table 53).

In Table 53, students were asked about their opinion on the greater inclusion of sustainable development content in teaching, and between them were offered pairs of opposite statements and a scale of numbers from 1-7. Students were asked to indicate which statement their opinion was closer to. Number 1 refers to statements that mean positive attitudes about the contents of sustainable development: Useful; Necessary; Interesting; Easy for teachers to implement; Easy for students to learn; Important for the whole society; Important for students; Important for my further education; Important for future generations; Important for a healthy environment; Important for human health; Important for survival on Earth. Number 7 implies complete agreement with statements that are the opposite of the above adjectives.

4.3. Statistical analyses

Different statistical methods of descriptive, inferential, and factor statistics were used. The obtained data were statistically processed using statistical package 2.3.18. versions of

Jamovi statistical software (https://www.jamovi.org). The data from all three surveys were statistically processed separately. In the database, there were:

- the total number of respondents who opened the survey;

- the total number of respondents who started the first page of the survey, but gave up on completing it further;

- the total number of respondents who filled out most of the survey;

- the total number of respondents who completely filled out the survey.

Data were included in the statistical analysis depending on which research goal we wanted to fulfill, ie. depending on the scientific question, and to use as much collected data as possible. Such a comprehensive statistical data processing was done with the aim of reaching conclusions that will apply to each target group of respondents individually. Also, following the obtained results, a proposal of measures that could improve the situation in the area that will be covered by this research will be given.

Descriptive statistics methods were used to describe the basic characteristics of the obtained data. Based on the frequencies and depending on the type of variable (categorical, ordinal, interval), a percentage, a measure of central tendency (mean value, median, mode), as well as a measure of dispersion (standard deviation) were calculated. The Shapiro-Wilk test was used to establish the normality of the distribution. Based on the test results, it was decided to use parametric and non-parametric tests in searching for differences between groups. Almost all variables were found to violate this assumption at the $p < 0.001$ level. Accordingly, nonparametric statistical tests were a good choice for examining differences between groups. The chosen method was the non-parametric Kruskal-Wallis test and the epsilon square (ε^2) as a measure of the effect size in the examples, when we were looking for differences between multiple groups. When we investigated the differences between the two groups, we used the Mann-Whitney test and the rank biserial correlation (r_{rb}) as a measure of the effect size.

To determine the correlation strength between the two variables, the Spearman correlation coefficient was applied. This choice was made based on the seven-point response scale used, where the distances between categories were assumed to be equal despite the lack of explicit interval descriptions. The Spearman coefficient is appropriate for measuring correlation strength and effect size in such cases. However, considering the nature of the response scale—1 to 6, ranging from "Never" to "Very Often"—and the non-equal intervals between categories, the polychoric correlation method was used to analyze associations between the items (Choi et al., 2010).

Based on the results of the Kruskal-Wallis test, ε^2 (epsilon squared) was calculated. According to Rea and Parker (1992), the values of ε^2 can be interpreted as follows: 0.00 < 0.01 – Negligible; 0.01 < 0.04 – Weak; 0.04 < 0.16 – Moderate; 0.16 < 0.36 - Relatively strong; 0.36 < 0.64 – Strong; 0.64 < 1.00-Very strong. When three or more categories were considered, the Dwass-Steel-Critchlow-Fligner test was used for pairwise comparisons.

The Mann-Whitney test was used in the examples where two groups of students were compared. The measure of the size of the effect was the rank biserial correlation of the value of the coefficient r_{rb} which were interpreted as Dancey and Reidy (2007): 0.00 - 0.1 - Negligible; 0.1 - 0.3 - Weak; 0.4 - 0.6 - Moderate and above 0.7-Strong.

For the analysis of multivariate instruments, where for the description or properties of a phenomenon we must include several variables presented in the form of tables used in the research, we used factorial statistics (Field, 2013). Since the instruments have not been used by other researchers in such a form, an exploratory factor analysis (EFA) was previously conducted using principal axis factoring as a factor extraction method and direct oblimin rotation to estimate the latent structure of the instruments (Watkins, 2018). Parallel analysis is the chosen method to retain the extracted factors. The reliability of the instruments and factors that emerged from the EFA analysis was assessed using Cronbach's alpha coefficient, and a value of 0.7 was chosen as the limit value for continuing the analysis. To establish the suitability of the matrix for factor analysis, Bartlett's test was applied - to check the homogeneity of variances between several groups of data, and the KMO (Kaiser-Meyer-Olkin) test - to measure the common variation among variables and assess the suitability of

the data for factor analysis. In the interpretations, only factor loadings of individual items above the value of 0.4 were taken into account. Measures of model fit and correlations between extracted factors are reported accordingly. Cronbach's alpha of the entire scale and of the factors, if extracted, are given as a measure of reliability. Inter-factor correlation serves to understand the complex interrelationships between different variables and how these variables are grouped into different factors.

5. RESULTS

Considering that three studies were conducted as part of this doctoral dissertation, the results are presented individually for each study.

5.1. Results of research conducted among elementary and high school teachers in Montenegro

The presentation of the results is divided into four parts, and in each of them, there are segments with a comparative analysis between three groups of teachers who work in different schools (group 1 - teachers who work in elementary schools, group 2 - teachers who work in gymnasium and group 3 - teachers from high vocational schools).

5.1.1 Part 1: Familiarity with the content of ESD program

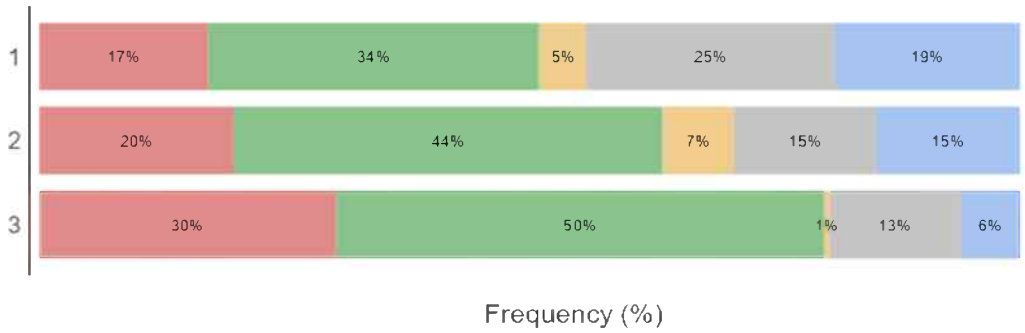
Familiarity with the cross-curricular program ESD was assessed with a 5-item multiple-choice instrument (Table 4).

Table 3: Familiarity with the cross-curricular program - Education for sustainable development

Code	Text	N	N%
$Q1a_1$	I'm not familiar with it and I'm not interested in finding out	195	18.4
$Q1b_1$	I'm not familiar, but I'm interested to find out	400	37.8
$Q1c_1$	I'm familiar with it, but I don't know what it means exactly	51	4.8
$Q1d_1$	I am partially familiar	245	23.1
$Q1e_1$	I am familiar with it and know what it entails	168	15.9

Table 4 shows that as many as 56.2% of respondents are not familiar with the ESD program. Slightly less than one-fifth are not interested in learning about it, while just under one-fifth believe they are familiar with it and understand what it entails. Slightly less than a quarter stated that they are partially familiar with it.

The differences between the teachers of elementary, gymnasium and high vocational schools related to familiarity are shown in Figure 2.



legend: 1= elementary school; 2= gymnasium; 3 = high vocational school.

I'm not familiar with it and I'm not interested in finding out

I'm not familiar, but I'm interested to find out

I'm familiar with it, but I don't know what it means

I am partially familiar

I am familiar with it and know what it entails

Frequency (%) = frequency expressed in percentage

Figure 2: Differences in knowledge of the ESD program between teachers of elementary, gymnasium, and vocational high schools

Figure 2 shows that there are significant differences between teachers working in different types of schools. While about half of elementary school teachers stated they were not familiar with the program, these numbers are much higher in high schools, 64% in

gymnasium and 80% in vocational high schools. In high schools, there is a greater interest in learning about these topics, particularly in vocational high schools.

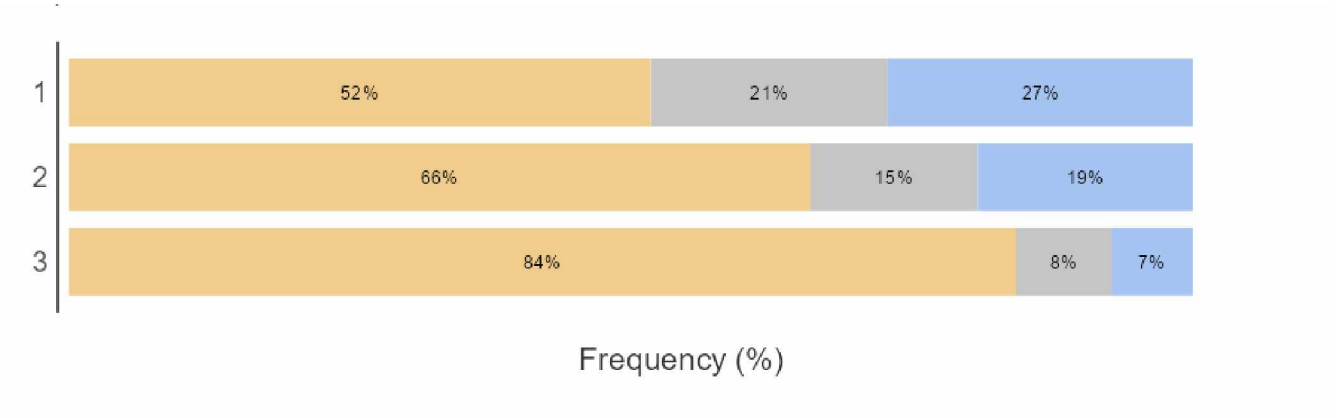
Familiarity with and introduction to the ESD program was assessed with a 3-item multiple-choice instrument (Table 5).

Table 4: Familiarity and implementation of the ESD program in the classroom

Code	Text	N	N%
$Q2a_1$	I am not familiar with the program and I do not use it in teaching	617	58.3
$Q2b_1$	I am familiar with the program, but I do not use it in teaching	211	19.9
$Q2c_1$	I am familiar with the program and I use it in teaching	230	21.7

Two findings can be concluded from the results shown in Table 5. The results show that only slightly more than a fifth of the respondents included the ESD program in their teaching. Another finding is that about two-fifths of teachers are familiar with the program, and only about half of them include it in teaching practice.

Differences between teachers of elementary, gymnasium and vocational high schools related to the familiarity and implementation of ESD program in the classroom are shown in Figure 3.



Legend:

1= elementary school; 2= gymnasium; 3 = high vocational school.

I am not familiar with the program and I do not use it in teaching

I am familiar with the program, but I do not use it in teaching

I am familiar with the program and I use it in teaching

Frequency % = frequency expressed in percentage

Figure 3: Differences in familiarity and implementation of the ESD program in the classroom between teachers of elementary, gymnasium, and vocational high schools

From Figure 3, it can be concluded that there are significant differences in the inclusion of ESD between teachers who come from different types of schools. The highest level of implementation is among elementary school teachers (27%), while the lowest is among vocational school teachers (7%), with secondary school teachers in the middle (19%).

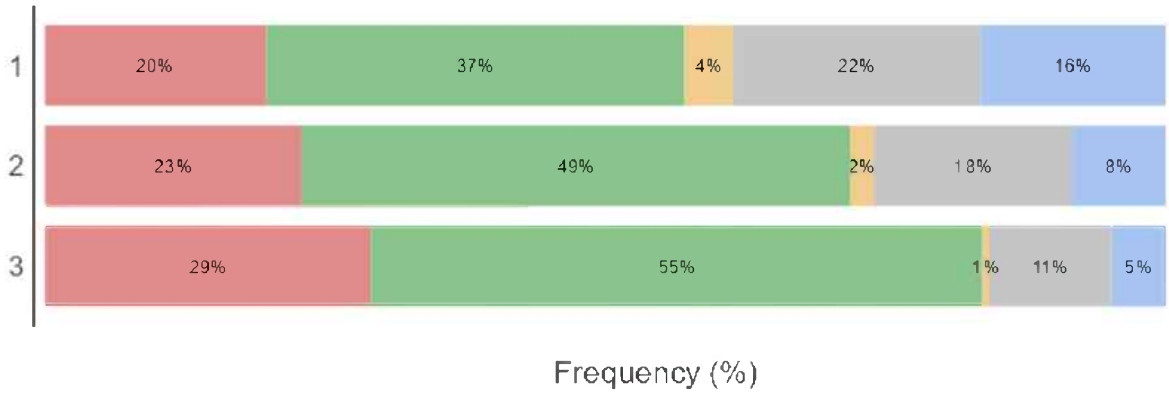
Familiarity with the methodological instructions for the implementation of the ESD program (Table 6) was assessed on the same 5-point scale as in $Q2_1$.

Table 5: Familiarity with the methodological instructions for the realization of the ESD program

Code	Text	N	N%
$Q3a_1$	I'm not familiar and I'm not interested in finding out	199	20
$Q3b_1$	I'm not familiar, but I'm interested to find out	422	42.5
$Q3c_1$	I'm familiar with it, but I don't know what it means exactly	40	4
$Q3d_1$	I am partially familiar	197	19.8
$Q3e_1$	I am familiar with it and I know what it entails	136	13.7

Table 6 shows that 62.5% of the respondents are not familiar with the methodological instructions for the implementation of the ESD program. Exactly one-fifth of respondents are not even interested in finding out about it, while slightly more than an eighth are completely familiar with it.

The differences between the teachers of elementary, gymnasium and vocational high schools related to the knowledge of the methodological instructions for the implementation of the ESD program are shown in Figure 4.



Legend:

1= elementary school; 2= gymnasium; 3 = high vocational school.

I'm not familiar and I'm not interested in finding out

I'm not familiar, but I'm interested to find out

I'm familiar with it, but I don't know what it means exactly

I am partially familiar

I am familiar with it and I know what it entails

Frequency % = frequency expressed in percentage

Figure 4: Differences in the familiarity of the methodological instructions for the implementation of the ESD program between teachers of elementary, gymnasium, and high vocational schools

From Figure 4 it can be found that there are big differences between teachers coming from different types of schools. While slightly less than 60% of teachers in elementary schools are not familiar with the methodological instructions, these numbers are significantly higher in high schools. It is 72% in gymnasiums and 84% in vocational high schools. Also, there is a noticeable difference between the 16% of teachers from elementary schools who

are familiar with the methodological instructions and half of that percentage of teachers from gymnasiums and even less in vocational high schools. In high schools, there is a more pronounced interest in learning these contents, especially in vocational high schools.

5.1.2. Part 2: Incorporating Cross-Curricular Topics (CCT) of ESD into teaching

The frequencies of inclusion of CCTs (Table 7) were measured using a scale with categories: Scale = 1 - Never; 2 - Very rare; 3 - Rarely; 4 - Sometimes; 5 - Often; 6 - Very often.

Table 6: Frequency and measures of central tendency of inclusion of cross-curricular topics (CCTs) in teaching. The results are sorted by descending median.

		Frequencies									
Code	CCTs	1	2	3	4	5	6	Mean	SD	Med.	ε^2
$Q5c_1$	Environmental Protection	26.8	8.1	7.7	19.4	24.6	13.4	3.47	1.82	4	0.02
$Q5f_1$	Health education	29	11.1	8.7	21.7	20.3	9.2	3.21	1.76	4	0.024
$Q5g_1$	Human rights education	33.2	7.4	7.9	21.9	21.9	7.7	3.15	1.78	4	0.02
$Q5h_1$	Entrepreneurial learning	33.1	6,7	9.4	25	19.8	6	3.1	1.72	4	0.026
$Q5a_1$	Climate change	30.5	15.3	12.4	24.5	13.9	3,4	2.86	1.57	3	0.02
$Q5d_1$	Sustainable cities and settlements	38	11.3	12.6	23.1	11.6	3.5	2.69	1.6	3	0.016
$Q5e_1$	Biodiversity	36.9	15	12.1	17.2	13.8	5	2.71	1.65	2	0.022
$Q5b_1$	Green economy	39.1	12.3	10.9	21.8	12.6	3,3	2.66	1.61	2	0.02

Scale = 1 - Never; 2 - Very rare; 3 - Rarely; 4 - Sometimes; 5 - Often; 6 - Very often; ε^2 = epsilon squared (teachers from elementary, gymnasium, and high vocational schools)
Legend: CCT- cross-curricular topics; SD-standard deviation; Med.-median.

Table 7 reveals that the reported numbers for individual CCTs are much higher than the summary total shown in Table 5. Therefore, it can be assumed that teachers include some topics that correspond to the objectives of ESD, without explicitly recognizing them.

According to the medians, about half of the teachers sometimes include Environmental Protection, Health Education, Human Rights Education, and Entrepreneurial Learning in their teaching. All other questions are included rarely or very rarely.

All differences between teachers from elementary, gymnasium, and high vocational schools are statistically significant in all items at the $p < 0.005$ level. The general pattern is that all CCTs are most often included in the teaching by elementary school teachers, then by gymnasium teachers, and finally by high vocational school teachers. However, the differences based on the interpretation of Epsilon squared between all three groups can be interpreted as weak.

Additional insights into CCTs implementation are shown in Table 8. Cronbach's alpha of the scale is high at 0.96. Due to the use of an ordinal scale to assess a theoretically normally distributed latent variable ranging from never to always, polychoric correlation analysis as a measure of association was chosen.

Table 7: Polychoric correlations between cross-curricular topics (CCTs)

	Q5a$_1$	**Q5b$_1$**	**Q5c$_1$**	**Q5d$_1$**	**Q5e$_1$**	**Q5f$_1$**	**Q5g$_1$**	**Q5h$_1$**
Q5a$_1$	1.00							
Q5b$_1$	0.87	1.00						
Q5c$_1$	0.84	0.85	1.00					
Q5d$_1$	0.84	0.85	0.87	1.00				
Q5e$_1$	0.86	0.85	0.88	0.87	1.00			
Q5f$_1$	0.76	0.80	0.87	0.80	0.83	1.00		
Q5g$_1$	0.71	0.76	0.82	0.79	0.75	0.85	1.00	
Q5h$_1$	0.72	0.75	0.78	0.77	0.71	0.75	0.80	1.00

From the matrix given in Table 8, it can be recognized that all correlations fall within the range in which all items can be considered highly correlated (range 0.71 - 0.88), which allows the conclusion that teachers treated all CCTs of ESD of the curriculum more or less equally.

5.1.3. Part 3: Attitudes towards the inclusion of ESD content in the teaching of their subjects

Attitudes towards the inclusion of ESD content in the teaching of their subjects were measured using a seven-point semantic differential scale with bipolar adjectives.

Table 8: Frequency and measures of central tendency of attitudes towards the inclusion of ESD content in the teaching of their subjects

			frequency %											
Code	N	Positive attitudes	1	2	3	4	5	6	7	Negative attitudes	Mean	SD	Med.	ε^2
$Q6g_1$	946	Important for students.	40.9	9.9	7.5	11.7	9.1	4.8	16.1	Unimportant to students.	3.17	2.28	2	0.007
$Q6j_1$	944	Important for healthy living. the middle.	46.6	8.4	4.9	9	7.5	4.8	18.9	Unimportant for healthy living. the middle.	3.12	2,4	2	0.005
$Q6k_1$	947	Important for human health	46.1	8.3	5.5	8,9	8.2	4,4	18.5	Unimportant for human health.	3.12	2.39	2	0.005
$Q6l_1$	946	Important for survival on Earth.	46.5	7.5	5.1	9.3	7	5,6	19	Irrelevant to survival on Earth.	3.16	2.42	2	0.006
$Q6f_1$	949	Important for the whole society.	43.8	10	6.2	10.6	8.1	4.6	16.8	Unimportant to society.	3.11	2.32	2	0.005
$Q6i_1$	944	Important for future generations.	43.6	9.2	6.4	10.4	8.3	5.2	16.9	Irrelevant for future generations.	3.14	2.33	2	0.006
$Q6b_1$	946	Necessary.	35.3	8,9	13.1	13.3	9.1	5.5	14.8	Needlessly.	3.28	2.19	3	0.007
$Q6a_1$	976	Useful.	34.1	9.5	11.5	16.3	16.3	4,4	14.5	Useless.	3.29	2.16	3	0.008
$Q6h_1$	947	Important for student education.	36.1	9.7	9.7	13.6	9.1	5,7	15.7	Irrelevant for student education.	3.29	2.24	3	0.01
$Q6c_1$	946	Interesting.	33.7	10	10.8	13.6	10.5	5,7	14.6	Boring.	3.32	2.19	3	0.006
$Q6e_1$	947	Easy for students to learn.	22.2	10.6	15.4	22.2	11.7	4.8	13.2	Difficult for students to learn.	3.58	1.97	4	0.002
$Q6d_1$	943	Easy to implement.	11.3	8.6	14	20.4	11.8	5,7	28.2	Difficult to realize.	4.43	2.05	4	< 0.001

Scale; 1; 2; 3; 4; 5; 6; 7; ε^2 = epsilon squared (teachers from elementary, gymnasium and high vocational schools)

Since lower numbers impose positive attitudes and statements, it is recognized that the medians and means of all statements, except for Q6d (easy – difficult to implement) and Q6e (easy – difficult for students to learn), are below the middle of the scale (4). Therefore, we can reconstruct the opinions that more than half of the teachers: a) consider the inclusion of sustainable development content in the teaching of their subject as something that is not easy for them and their students; b) there are positive topics and reasons for inclusion in teaching. The claim is supported by the finding that all modes except Q6d (7) are 1.

Differences between teachers from elementary, gymnasium, and high vocational schools are statistically visible in all items. The general pattern is that in all items with seven-point semantic differential scales with bipolar adjectives, the most positive attitude towards greater inclusion of ESD content is expressed by elementary school teachers, followed by gymnasium teachers and vocational school teachers at the end. However, differences based on Epsilon-squared interpretation between all three groups (Table 9) are negligible or weak.

Cronbach's alpha of the scale is = 0.978 which allows the assumption of redundancy of some items. Applying principal axis factoring, one principal component was extracted (KMO = 0.961; Barlett's test = (χ^2 = 202001; df = 66; $p < 0.001$)) explaining) 79.9% of the variance (eigenvalue = 9.59) and item component loadings ranging from 0.965 to 0.862. The exception is item $Q6d_1$ (easy – difficult to implement), where the loading is 0.31. It should be noted that an additional factor combining $Q6a_1$ and $Q6b_1$ (useful – useless and necessary – unnecessary) emerged (explained variance = 4.89%; eigenvalue is 0.59), but both factor loadings were below 0.4 and they intersected on the first factor, as well. That's why is not kept.

By analyzing the Spearman correlation coefficients, it was additionally possible to identify pairs with correlations greater than 0.9 (bolded in Table 10), which required shortening the scale and identifying clusters of highly correlated items.

Table 9: Spearman's correlation coefficients between statements that reflect attitudes towards the inclusion of ESD content in the teaching of their subjects

	Q6a$_1$	**Q6b$_1$**	**Q6c$_1$**	**Q6d$_1$**	**Q6e$_1$**	**Q6f$_1$**	**Q6g$_1$**	**Q6h$_1$**	**Q6i$_1$**	**Q6j$_1$**	**Q6k$_1$**	**Q6l$_1$**
Q6a$_1$	—											
Q6b$_1$	**0.94**	—										
Q6c$_1$	**0.91**	**0.90**	—									
Q6d$_1$	0.36	0.37	0.35	—								
Q6e$_1$	0.81	0.80	0.81	0.45	—							
Q6f$_1$	0.84	0.85	0.87	0.34	0.79	—						
Q6g$_1$	0.86	0.86	0.88	0.36	0.80	**0.94**	—					
Q6h$_1$	0.85	0.85	0.87	0.34	0.79	**0.91**	**0.93**	—				
Q6i$_1$	0.84	0.84	0.86	0.33	0.78	**0.94**	**0.94**	**0.93**	—			
Q6j$_1$	0.81	0.82	0.84	0.31	0.75	**0.93**	**0.92**	**0.90**	**0.95**	—		
Q6k$_1$	0.81	0.81	0.83	0.30	0.75	**0.92**	**0.92**	0.89	**0.94**	**0.97**	—	
Q6l$_1$	0.80	0.80	0.82	0.29	0.75	**0.91**	**0.91**	0.89	**0.94**	**0.95**	**0.96**	—

All correlations are statistically significant at the $p < 0.001$ level.

From Table 10, it can be found that the first major cluster of highly correlated items forms statements with a median of 2 (Table 9) from variables containing the word "important". The second cluster, where the median is greater than 3, combines the words "necessary", "useful" and "interesting".

Teachers' attitudes towards the reasons that influence the inclusion of ESD content in their subject were measured using a seven-point Likert scale ranging from "completely disagree" (1) to "completely agree" (7). The results are presented in Table 11.

Table 10: Frequency and measures of central tendency of teachers' attitudes about the reasons that influence the inclusion of ESD content in their subject. Results are sorted by descending median.

			frequency %										
Code	n	Positive attitudes	1	2	3	4	5	6	7	Mean	SD	Med.	ε^2
$Q7q_1$	906	I don't have adequate literature.	8.1	7.2	8.1	11.9	8,9	8.3	47.6	5.22	2.08	6	0.018
$Q7o_1$	907	I need quality training to be ready to incorporate ESD into teaching practice.	9.5	6,8	8.6	11.2	8.7	7.7	47.4	5,16	2.13	6	0.014
$Q7p_1$	904	It is necessary to introduce a compulsory subject that would deal only with sustainable development.	10.1	6,7	6.6	13.7	8.3	6.9	47.7	5.15	2.14	6	0.008
$Q7i_1$	900	Nobody controls the implementation of ESD.	8.6	7.9	8.2	15.2	8,9	6,7	44.6	5.06	2.1	6	0.004
$Q7d_1$	906	Teachers are not adequately paid to invest efforts in ESD.	13.1	8.1	8,9	11.5	8.2	5.2	45	4.89	2.27	6	< 0.001
$Q7g_1$	906	The school is not equipped with teaching aids that are necessary for topics on sustainable development.	8,9	7.9	9.6	14.3	8.6	8.5	42.1	4.99	2.11	6	< 0.001
$Q7c_1$	908	I am not educated enough about sustainable development.	10.9	13.1	10.7	12.2	8.1	7.4	37.6	4.66	2.22	5	0.006
$Q7f_1$	907	It is more difficult to prepare and organize a lesson that includes sustainable development.	11.7	12	9.5	15.3	8.3	6.3	36.9	4.63	2.21	5	0.002
$Q7n_1$	904	I don’t have methodological recommendations for the implementation of ESD.	10.7	9.7	9.6	13.1	7.5	7.5	41.8	4.87	2,2	5	0.017

Q7b 1	906	The main goals of my subject are too demanding, so I don't have time for additional topics.	14	12.3	12.7	13.8	8.6	4.3	34.3	4.41	2.25	4	0.002
Q7e1	905	I am not motivated enough to put effort into extracurricular activities.	16.6	10.2	9.1	14.8	7.1	5	37.3	4.5	2.32	4	0.002
Q7h1	907	ESD is not equally represented in all subjects. I will not try harder than others.	17.2	9.5	10.3	16.5	8.6	3.7	34.2	4.38	2.28	4	0.002
Q7j1	905	Students are not interested in learning about sustainable development.	18	12	10.3	17.8	8	3.6	30.3	4.18	2.26	4	0.009
Q7k1	903	Additional activities in class are not valued, so it is best to focus on the core subject objectives.	19.9	11.3	8.7	13.3	7.4	3.7	35.7	4.31	2.38	4	0.007
Q7l1	904	Contents about sustainable development are often outside the school textbook, so students and their parents are against it.	14.3	10.2	9.7	18	7.9	5.5	34.4	4.49	2.22	4	0.007
Q7a1	907	ESD is irrelevant. Therefore, it does not warrant attention.	62.7	9.9	5.2	10.1	3,4	2.5	6.1	2.13	1.82	1	< 0.001
Q7m1	904	Students should only learn about sustainable development at university.	63.1	10.5	5.8	10	3.9	1.7	5.2	2.07	1.73	1	0.002

Scale: 1 - I strongly disagree; 2; 3; 4; 5; 6, 7- I completely agree. ε^2 = epsilon squared (teachers from elementary, gymnasium, and high vocational schools). Legend: SD-standard deviation; Med.-median.

Since lower numbers imply disagreement with the given statements, it is recognized that the medians and means of all statements (except $Q7a_1$ and $Q7m_1$) are above the median of 4. It can be concluded that the teachers recognized the importance of ESD, as well as expressed a clear attitude that students should familiarize themselves with these contents before starting their studies. Also, the teachers pointed out the main obstacles to the inclusion of ESD: the lack of adequate literature, the need for quality training, the absence of a competent institution to control the implementation, inadequate salaries of teachers, and the lack of teaching aids. These claims are supported by the finding that all modes are 7, except $Q7a_1$ and $Q7m_1$ (1). In most items, there is no significant difference between the teachers of the three types of schools. Differences based on epsilon-squared interpretation between all three groups are weak.

The items presented in Table 11 were subjected to factor analysis (KMO = 0.961; Bartlett's test = (χ^2 = 13080; df = 136; $p < 0.001$)). Applying principal axis factoring and oblimin rotation, four factors were extracted, however, the fourth factor was not retained because all items loaded on it below the 0.4 level of cross-loading and on the other factors. Another reason not to keep him was his low own value (0.260). So we are left with three factors that explain 68% of the variance. Factor loadings are presented in Table 12.

Table 11: Factor loadings extracted from the responses presented in Table 11

Code	1	2	3	Uniqueness
$Q7e_1$	0.95			0.18
$Q7h_1$	0.94			0.21
$Q7f_1$	0.86			0.21
$Q7b_1$	0.86			0.25
$Q7k_1$	0.82			0.14
$Q7d_1$	0.81			0.32
$Q7j_1$	0.78			0.29
$Q7l_1$	0.72			0.20
$Q7g_1$	0.71			0.33
$Q7c_1$	0.57			0.29
$Q7i_1$	0.49			0.45
$Q7o_1$		0.95		0.19
$Q7q_1$		0.82		0.25
$Q7n_1$		0.73		0.22
$Q7p_1$		0.46		0.54
$Q7m_1$			0.76	0.42
$Q7aR_1$			-0.55	0.67
variance %	43.99	18.62	5.45	
Unique value	7.478	3.165	5.45	
Cronbach's alpha				
Interfactor correlations	-	0.794	0.027	
$p < 0.001$			-0.034	

Interpretation of factor loadings (Table 12) revealed three factors representing latent variables. The first factor combines 11 items and can be interpreted as teachers' agreement that they are not sufficiently motivated through internal and external motivation (eg. higher salary and rewards). Moreover, we can identify several signs that indicate the motivation to include ESD in teaching and the recognition of the importance of the influence of other factors (eg. control).

The second factor groups four items ($Q7o_1$, $Q7k_1$, $Q7n_1$, $Q7p_1$) that show teachers' agreement that they need quality training, methodological recommendations, and adequate literature for the implementation of ESD programs. They also agreed that it is necessary to introduce a compulsory subject that would deal only with sustainable development. Synthesis can be understood as a feeling that due to the lack of materials and training, someone else who is better prepared should implement ESD. The second synthesis could be interpreted as a call for better quality support to achieve the goal of implementation.

The third factor groups two items ($Q7m_1$, $Q7aR_1$) that show teachers' disagreement that ESD is irrelevant and applicable only at the university level, which leads to the synthesis that due to its relevance, ESD should be taught in elementary and high schools.

5.1.4. Part 4: The most frequently used teaching methods in teaching practice

Results are presented in Table 13.

Table 12: Frequency and measures of the central tendency of using teaching methods in teaching practice. Results are sorted by descending median.

			frequency %									
Code	N	Text	1	2	3	4	5	6	Mean	SD	Med.	ε^2
$Q8b_1$	893	I lead a debate and dialogue with the students.	14	12.1	7.6	11.2	35.5	19.6	4.01	1.72	5	0.007
$Q8a_1$	888	I deliver the lesson, and the students listen.	7.9	14.1	10.8	19.1	14.8	33.3	4.19	1.68	4	0.008
$Q8c_1$	894	I conduct classes using group work.	22.8	9.6	5.4	27.3	26.4	8.5	3.5	1.69	4	1.87e-4
$Q8k_1$	890	I transfer knowledge to students through quizzes and educational games.	26.9	12.4	9.3	25.2	18.1	7.9	3.19	1.69	4	0.04
$Q8l_1$	891	I mark important dates for the environment and the community.	35.9	7.9	6.1	20	20.8	9.4	3.1	1.84	4	0.052
$Q8g_1$	891	I use presentations and workshops.	25.5	15.9	9.7	24.2	15.9	8.8	3.15	1.68	3	0.007
$Q8e_1$	892	I work on projects important to the school and the community.	30.5	10.9	11	25.6	15.2	6,8	3.05	1.68	3	0.004
$Q8d_1$	893	I teach in the schoolyard.	42.3	11	10.8	25.2	6,8	3.9	2.55	1.58	2	0.062
$Q8h_1$	891	I take students on short trips to become familiar with nature.	43.9	11.9	10.5	20.1	10	3.6	2.51	1.6	2	0.053
$Q8j_1$	892	I conduct classes that involve teachers from various subjects.	40	13.8	12.9	23.8	7.6	1.9	2.51	1.49	2	0.018
$Q8i_1$	890	I demonstrate methods for waste separation and recycling.	45.5	11.2	9.2	20.9	10.1	3	2.48	1.6	2	0.046
$Q8m_1$	892	I organize activities regarding environmental problems in the town.	47.1	10	11.9	18.8	8,9	3,4	2.42	1.58	2	0.03
$Q8o_1$	889	I organize visits to competent institutions.	49.2	12.7	10.2	19.6	6.4	1.9	2.27	1.48	2	0.015
$Q8n_1$	891	I organize environmental sections.	57.5	9.3	8.6	14.3	6.5	3.8	2.14	1.55	1	0.028
$Q8f_1$	976	I organize afforestation actions.	60	13.1	11.6	10.7	3,4	1,2	1.88	1.28	1	0.018

Scale: 1 – Never; 2 – Very rare; 3 – Rarely; 4 – Sometimes; 5 – Often; 6 – Very often; ε^2 = epsilon squared (teachers from elementary, gymnasium, and high vocational schools). Legend: SD-standard deviation; Med.-median.

Following the median and mode values, it can be concluded that teachers often use dialogue and monologue. Teaching methods that allow students to have direct contact with nature, which are the most recommended for developing students' awareness of sustainable development, are used very rarely or never. Mode values partially confirm these claims and show that the monologue stands out as the most common teaching method, followed by debate and group work. For all other methods, the value of mode indicates that they are never used.

In some items, the statements of teachers from three different types of schools are uniform, but there is a difference in most of them. The general pattern is that all the offered interactive teaching methods that encourage awareness of sustainable development most often include elementary school teachers, then gymnasium teachers, and finally high vocational school teachers. Differences based on epsilon-squared interpretation between all three groups are small (Kruskal-Wallis test results and frequencies not given). Differences based on the interpretation of epsilon-square between all three groups are weak for most items ($0.01 < 0.04$), and moderate for items $Q8l_1$, $Q8d_1$, $Q8h_1$, and $Q8i_1$ ($0.04 < 0.16$).

If all the statements are synthesized, it can be concluded that traditional teaching methods are the most prevalent, while interactive teaching, which is crucial in ESD teaching, is poorly represented.

5.2. Results of research conducted among students in the first grade of high school (target group 2)

The results are divided into two parts. In the first part, students' familiarity with ESD content and the most commonly used teaching methods during elementary school education was presented and interpreted. The second part of the results gives an insight into the opinions and attitudes of students towards ESD and the importance of elementary school subjects for gaining knowledge about sustainable development.

5.2.1. Part 1. Students' familiarity with ESD content and the most commonly used teaching methods during elementary school education

5.2.1.1. Students' familiarity with cross-curricular topics (CCTs) during elementary school education

The results are presented in Table 14.

Table 13: Frequencies of ways of learning about cross-curricular topics (CCTs) during elementary school education. The results are sorted according to the increasing number of respondents for item 1 (1-I hear about this topic for the first time in this questionnaire). The highest values are bolded.

Code	CCTs	1	2	3	4	5	6	The sum of 3+4	Sum of 5+6
$Q1c_2$	Environmental	77	37	245	**276**	23	57	521	80
	Protection	10.9	5.2	34.7	**37.8**	3,3	8.1	73.8	11.4
$Q1e_2$	Biodiversity	100	39	**442**	81	21	23	523	44
		14.2	5.5	**62.6**	11.5	3	3,3	74.1	3.6
$Q1f_2$	Health education	103	86	72	**295**	56	94	367	150
		14.6	12.2	10.2	**41.8**	7.9	13.3	52	21.2
$Q1a_2$	Climate change	118	76	131	**263**	60	58	394	118
		16.7	10.8	18.6	**27.3**	8.5	8.2	45.9	16.7
$Q1g_2$	Human rights	120	94	46	**286**	72	88	332	160
	education	17	13.3	6.5	**40.5**	10.2	12.5	47	22.7
$Q1d_2$	Sustainable cities and	173	147	69	**198**	77	42	267	119
	settlements	24.5	20.8	9.8	**28**	10.9	5.9	37.8	16.8
$Q1b_2$	Green economy	**286**	117	154	61	61	27	215	88
		40.5	16.6	21.8	8.6	8.6	3.8	30.4	12.4
$Q1h_2$	Entrepreneurial	**299**	158	26	109	59	55	135	114
	learning	**42.4**	22.4	3.7	15.4	8.4	7,8	19.1	16.5

Legend: 1-This is the first time I heard about this topic in this questionnaire; 2-This topic is only mentioned, but not explained in school; 3-This topic is explained in detail only in biology classes; 4-This topic is explained in detail in several subjects; 5- I only heard about this topic in the media; 6-I learned about this topic independently from available literature.

When analyzing the data presented in Table 14, several important findings emerge. The most important finding is that every cross-curricular topic (CCTs) missed by some

number of students, with with a range of about 11% for Environmental Protection to about 40% for Green economy and Entrepreneurial learning (column 1). On the other side of Table 14 (the sum of columns 5 and 6), the frequencies in the last two columns, which pertain to media and literature, demonstrate the importance of structured educational approaches to ESD. In majority cases, a threshold of 10% for self-education and private initiative it's not reached, and only at four in most cases, the percentage is in the range of 10% to 15%. Informative, but not formative the role of formal education is easily identifiable in column 2, where the answer is given Yes are topics only mentioned, but not explained ranges from about 5% to 22%.

Only three topics (Health education, Human rights, and Environmental Protection) reach level of about 40% intersubject implementation. At the end range and they are close to 10% Biodiversity and Green Economy. The situation can be considered somewhat improved, as topics closely related to the general objectives of Biology ($Q1c_2$ – Environmental Protection, $Q1e_2$ – Biodiversity) are predominantly integrated into the context of this subject. Despite intentions to do everything ESD topics are covered on the cross-curricular way, students are with these topics mostly meet in the framework curriculum the program of biology. Acquaintance with topics, therefore, can conclude in total 3 (This topic is explained in detail only in biology classes) and 4 (This topic is detailed explained in several subjects), which show that the highest familiarity amounts to about three-quarters of students and for topics Environmental Protection and Biodiversity, and the lowest is approx one fifth for Entrepreneurship learning. It is obvious that they are students during year basic schools least to meet with concepts Entrepreneurial learning and Green Economy. Around two-fifths respondents met for the first time with mentioned topics in this questionnaire.

5.2.1.2. Inclusion of ESD content in elementary education school

Results are presented as frequencies, measures of central tendencies, and exploratory factorial analysis in Tables 15, 16, 17.

Table 14: Measures central tendency frequency inclusion of ESD content in elementary school teaching. Results are sorted in descending order of mean.

Code	Text	N	Miss.	Mean	Med.	Mode	SD
Q6ak2	How can each of us help to preserve the environment?	630	77	3.97	4	5	1.68
Q6aw2	The importance of a healthy environment for human health.	631	76	3.93	4	4 [a]	1.67
Q6az2	Respect for diversity.	628	79	3.91	4	6	1.75
Q6ac2	Consequences of climate change.	629	78	3.88	4	5	1.59
Q6av2	Consequences of improper nutrition and lack of physical activity.	631	76	3.84	4	4	1.68
Q6af2	The importance of forests and their sustainable management.	630	77	3.82	4	4	1.66
Q6ag2	The problem with waste and the importance of recycling.	629	78	3.82	4	4	1.66
Q6am2	Significance, composition, and sources of air pollution.	630	77	3.82	4	4	1.63
Q6au2	Flora and fauna of national parks, internationally protected habitats, and protected species in Montenegro.	628	79	3.80	4	4	1.65
Q6aj2	Ecological problems in Montenegro.	631	76	3.77	4	5	1.67
Q6at2	The consequences of the destruction of rivers, lakes, seas, and coasts.	627	80	3.76	4	5	1.63
Q6ab2	Global warming, the greenhouse effect.	630	77	3.74	4	4	1.56
Q6ax2	Rights and obligations in the community.	630	77	3.70	4	4	1.65
Q6ar2	The importance of land, its protection.	630	77	3.69	4	4	1.60
Q6ah2	Types and importance of renewable energy sources.	630	77	3.67	4	4	1.58
Q6ap2	Ways to reduce traffic pollution.	630	77	3.65	4	4	1.64

Code	Text	N	Miss.	Mean	Med.	Mode	SD
Q6as$_2$	Ecological importance of mountain areas.	631	76	3.57	4	4	1.62
Q6an$_2$	Acid rains and their impact.	630	77	3.54	4	4	1.63
Q6aq$_2$	Causes of biodiversity decline.	630	77	3.47	4	4	1.61
Q6ao$_2$	The importance of rational use of natural resources.	630	77	3.43	4	4	1.58
Q6al$_2$	Sources of noise and its impact on human health.	630	77	3.29	3	4	1.64
Q6ay$_2$	The difference between sex and gender.	630	77	3.26	3	1	1.71
Q6ai$_2$	Advantages and disadvantages of fossil fuels.	630	77	3.18	3	4	1.58
Q6ae$_2$	Sustainable agriculture.	629	78	3.07	3	1	1.59
Q6ba$_2$	European Union, advantages and disadvantages of Montenegro's entry into the European Union.	630	77	3.03	3	1	1.75
Q6ad$_2$	"Green economy".	626	81	2.92	3	1	1.62
Q6aa$_2$	Sustainable Development.	631	76	2.88	3	1	1.56

Legend: 1-Never; 2-Very rare; 3-Rarely; 4-Sometimes; 5-Often; 6-Very often; [a] There is more than one mode; only the first one is reported. Miss.-missing.

Table 15: Frequencies inclusion of ESD content in elementary school teaching. Results are sorted by increasing number of the respondents on item 1 (1-Never). The highest values are bolded.

Code	Text	1	2	3	4	5	6
Q6ab$_2$	Global warming, the greenhouse effect.	86	62	87	**169**	148	78
		13.7	9.8	13.8	**26.8**	23.5	12.4
Q6ac$_2$	Consequences of climate change.	83	58	71	154	**166**	97
		13.2	9.2	11.3	24.5	**26.4**	15.4
Q6aw$_2$	The importance of a healthy environment for human health.	86	54	86	**136**	133	**136**
		13.7	8.6	13.6	**21.6**	21.1	**21.6**
Q6am$_2$	Significance, composition, and sources of air pollution.	86	67	80	**153**	132	112
		13.7	10.6	12.7	**24.3**	21	17.8
Q6ah$_2$	Types and importance of renewable energy sources.	90	71	92	163	**135**	79
		14.3	11.3	14.6	25.9	**21.4**	12.5
Q6af$_2$	The importance of forests and their sustainable management.	91	64	83	**143**	130	119
		14.4	10.2	13.2	**22.7**	20.6	18.9
Q6ak$_2$	How can each of us help to preserve the environment?	91	47	77	117	**168**	130
		14.4	7.5	12.2	18.6	**26.7**	20.6
Q6at$_2$	The consequences of the destruction of rivers, lakes, seas, and coasts.	90	57	110	130	**135**	105
		14.4	9.1	17.5	20.7	**21.5**	16.7
Q6au$_2$	Flora and fauna of the national parks, internationally protected habitats, and protected species in Montenegro	93	55	89	**149**	130	112
		14.8	8.8	14.2	**23.7**	20.7	17.8
Q6ar$_2$	The importance of land, its protection.	94	63	92	**168**	124	89
		14.9	10	14.6	**26.7**	19.7	14.1
Q6ag$_2$	Problem with waste and the importance of recycling.	95	58	77	**150**	136	113
		15.1	9.2	12.2	**23.8**	21.6	18
Q6av$_2$	Consequences of improper nutrition and lack of physical activity.	95	53	90	**135**	133	125
		15.1	8.4	14.3	**21.4**	21.1	19.8
Q6ap$_2$	Ways to reduce traffic pollution.	100	70	95	**141**	132	92
		15.9	11.1	15.1	**22.4**	21	14.6
Q6ax$_2$	Rights and obligations in the community.	102	57	100	**138**	136	97
		16.2	9	15.9	**21.9**	21.6	15.4
Q6as$_2$	Ecological importance of mountain areas.	103	71	103	**156**	112	86
		16.3	11.3	16.3	**24.7**	17.7	13.6
Q6ao$_2$	The importance of rational use of natural resources.	105	83	117	**163**	87	75
		16.7	13.2	18.6	**25.9**	13.8	11.9
Q6az$_2$	Respect for diversity.	105	41	89	113	128	**152**
		16.7	6.5	14.2	18	20.4	**24.2**
Q6aj$_2$	Ecological problems in Montenegro.	106	50	82	132	**165**	96
		16.8	7.9	13	20.9	**26.1**	15.2
Q6an$_2$	Acid rains and their impact.	111	65	103	**165**	98	88
		17.6	10.3	16.3	**26.2**	15.6	14
Q6aq$_2$	Causes of biodiversity decline.	118	62	105	**169**	106	70
		18.7	9.8	16.7	**26.8**	16.8	11.1
Q6al$_2$	Sources of noise and its impact on human health.	133	85	107	**144**	92	69
		21.1	13.5	17	**22.9**	14.6	11
Q6ai$_2$	Advantages and disadvantages of fossil fuels.	136	92	109	**159**	83	51

		21.6	14.6	17.3	**25.2**	13.2	8.1
Q6ae 2	Sustainable agriculture.	**154**	89	116	151	69	50
		24.5	14.1	18.4	24	11	7.9
Q6ay2	The difference between sex and gender.	**157**	67	103	133	96	74
		24.9	10.6	16.3	21.1	15.2	11.7
Q6aa2	Sustainable Development.	**174**	102	124	122	72	37
		27.6	16.2	19.7	19.3	11.4	5.9
Q6ad2	"Green Economy"	**187**	82	113	123	80	41
		29.9	13.1	18.1	19.6	12.8	6.5
Q6ba2	European Union, advantages and disadvantages of Montenegro's entry into the European Union.	**200**	72	85	130	71	72
		31.7	11.4	13.5	20.6	11.3	11.4

Legend: 1-Never; 2-Very rare; 3-Rarely; 4-Sometimes; 5-Often; 6-Very often;

Table 16: Results of the exploratory factor analysis on the frequency of incorporating cross-curricular content of ESD in elementary school

Factor loadings

Code	Text	Factor 1	Factor 2	Uniqueness
$Q6aw_2$	The importance of a healthy environment for human health.	1.02		0.22
$Q6ak_2$	How can each of us help to preserve the environment?	0.98		0.2
$Q6av_2$	Consequences of improper nutrition and lack of physical activity.	0.94		0.27
$Q6am_2$	Significance, composition, and sources of air pollution.	0.89		0.22
$Q6au_2$	Flora and fauna of national parks, internationally protected habitats and protected species in Montenegro.	0.89		0.27
$Q6ag_2$	Problem with waste and the importance of recycling.	0.86		0.26
$Q6ap_2$	Ways to reduce traffic pollution.	0.85		0.25
$Q6ac_2$	Consequences of climate change.	0.81		0.3
$Q6ab_2$	Global warming, greenhouse effect.	0.80		0.34
$Q6az_2$	Respect for diversity.	0.76		0.39
$Q6ah_2$	Types and importance of renewable energy sources.	0.76		0.24
$Q6at_2$	The consequences of the destruction of rivers, lakes, seas, and coasts.	0.75		0.26
$Q6aj_2$	Ecological problems in Montenegro.	0.75		0.29

Factor loadings

Code	Text	Factor 1	Factor 2	Uniqueness
Q6af2	The importance of forests and their sustainable management.	0.744		0.276
Q6an2	Acid rains and their impact.	0.730		0.290
Q6ar 2	The importance of land, its protection.	0.725		0.228
Q6ax2	Rights and obligations in the community.	0.707		0.312
Q6ao2	The importance of rational use of natural resources.	0.668		0.305
Q6aq2	Causes of biodiversity decline.	0.625		0.309
Q6as2	Ecological importance of mountain areas.	0.563	0.327	0.279
Q6ae2	Sustainable agriculture.		0.757	0.289
Q6ad2	"Green Economy"		0.737	0.392
Q6ba2	European Union, advantages and disadvantages of Montenegro's entry into the European Union.		0.707	0.497
Q6aa2	Sustainable Development.		0.557	0.493
Q6ay2	The difference between sex and gender.		0.537	0.487
Q6ai2	Advantages and disadvantages of fossil fuels.	0.365	0.462	0.381
Q6al2	Sources of noise and its impact on human health.	0.397	0.458	0.339

Legend: The extraction method " principal axis factoring" was used in combination with "oblimin" rotation.

By analyzing the median values shown in table 15, several important conclusions can be drawn. It is evident that during elementary school education, the topics included in the

ESD curriculum for elementary schools were rarely included, falling into the "sometimes" or "rare" categories. The mode values in most items support this observation. However, there are exceptions where the mode value is 1 (indicating "never") for the following items: $Q6aa_2$, $Q6ad_2$, $Q6ae_2$, $Q6ai_2$ and $Q6ba_2$.

Further analysis of the significance of the frequency of inclusion of ESD content in teaching, the data matrix shows that the Cronbach's alpha of the instrument was 0.981. Applying EFA (table 17), two highly correlated factors were singled out, explaining 68.9% of the variance. The first factor (eigenvalue 14.37; 53.2% of explained variance) includes numerous topics that explain the impact of poor management of resources in Montenegro and throughout the planet, as well as the importance of their sustainable use. The second factor (eigenvalue 4.25; 15.7% of explained variance) includes the concept of sustainable development and green economy, as well as the advantages of Montenegro joining the EU. $Q6ai_2$ and $Q6al_2$ are present in both factors.

5.2.1.3. Most commonly used teaching methods in elementary school

The results of frequency, measures of central tendencies, and exploratory factor analysis are presented in Tables 18, 19, and 20.

Table 18: Measures of central tendencies in the use of different teaching methods applied in elementary school. Results are sorted by descending median.

Code	Text	N	Miss.	Mean	Med.	Mode	SD
$Q4a_2$	The teacher delivers a lesson, and students listen.	670	37	5.04	5	6	1.18
$Q4b_2$	Debate and dialogue between students and teachers.	669	38	3.63	4	4	1.56
$Q4g_2$	Presentations and workshops.	672	35	3.40	4	4	1.51
$Q4c_2$	Group work.	671	36	3.34	4	4	1.44
$Q4l_2$	Marking important dates for the environment and the community.	670	37	3.28	3	1	1.68
$Q4e_2$	Work on projects important to the school and community.	672	35	3.03	3	4	1.50
$Q4k_2$	Learning through quizzes and educational games.	671	36	2.74	3	1	1.52
$Q4h_2$	Trips to become familiar with nature.	670	37	2.73	2	1	1.53
$Q4m_2$	Organizing activities related to environmental problems in the town.	668	39	2.63	2	1	1.51
$Q4n_2$	Ecological sections.	667	40	2.60	2	1	1.58
$Q4j_2$	Work involving teachers from different subjects.	667	40	2.54	2	1	1.50
$Q4i_2$	Waste recycling.	669	38	2.51	2	1	1.58
$Q4o_2$	Visits to competent institutions.	667	40	2.40	2	1	1.45
$Q4f_2$	Organizing afforestation actions.	670	37	2.29	2	1	1.49
$Q4d_2$	Teaching in the schoolyard.	672	35	2.17	2	1	1.31

Scale: 1-Never; 2-Very rare; 3- Rarely; 4-Sometimes; 5-Often; 6-Very often.

Legend: Miss.-missing; Med.-median; SD-standard deviation.

After reviewing the data in Table 18, several observations emerge. Conventional teaching methods, which involve a teacher teaching a lesson while students passively listen ($Q4a_2$), were often used during elementary school education. Table 19 shows that the sum of columns 5 and 6 (often and very often is 78.4%). This is supported by a mode value of 6, indicating that this approach was commonly used. Interactive teaching methods, which encourage student participation, were less frequently used and generally fell into the "sometimes" or "rare" categories. Alternative teaching methods that involve direct actions and interactions with the natural environment are rarely used. This confirms a mode value of 1 for all items, with a median of 2.

Table 19: Frequencies of using different teaching methods in elementary school. The results are sorted by increasing number of respondents for item 1 (1-Never). The highest values are bolded.

Code	Text	1	2	3	4	5	6
$Q4a_2$	The teacher delivers the lesson, and the students listen.	16	21	30	78	235	**290**
		2,4	3.1	4.5	11.6	35.1	**43.3**
$Q4c_2$	Group work.	93	109	131	**202**	88	48
		13.9	16.2	19.5	**30.1**	13.1	7.2
$Q4g_2$	Presentations and workshops.	97	121	94	**183**	128	49
		14.4	18	14	**27.2**	19	7.3
$Q4b_2$	Debate and dialogue between students and teachers.	99	75	92	**182**	151	70
		14.8	11.2	13.8	**27.2**	22.6	10.5
$Q4l_2$	Marking important dates for the environment and the community.	**148**	102	94	135	121	70
		22.1	15.2	14	20.1	18.1	10.4
$Q4e_2$	Work on projects important to the school and community.	15	108	134	**158**	89	32
		22.5	16.1	19.9	**23.5**	13.2	4.8
$Q4h_2$	Trips to become familiar with nature.	**195**	146	99	139	55	36
		29.1	21.8	14.8	20.7	8.2	5.4
$Q4k_2$	Learning through quizzes and educational games.	197	135	112	**136**	55	36
		29.4	10.1	16.7	**20.3**	8.2	5.4
$Q4m_2$	Organizing activities related to environmental problems in the city.	**226**	117	108	136	56	25
		33.8	17.5	16.2	20.4	8.4	3.7
$Q4j_2$	Work involving teachers from different subjects.	**236**	134	107	110	54	26
		35.4	20.1	16	16.5	8.1	3.9
$Q4n_2$	Ecological sections.	**245**	117	94	120	54	37
		36.7	17.5	14.1	18	8.1	5.5
$Q4o_2$	Visits to competent institutions.	**254**	140	115	96	35	27
		38.1	21	17.2	14.4	5.2	4
$Q4i_2$	Waste recycling.	**262**	124	93	90	69	31
		39.2	18.5	13.9	13.5	10.3	4.6
$Q4d_2$	Teaching in the schoolyard.	**294**	143	118	80	21	16
		43.8	21.3	17.6	11.9	3.1	2,4
$Q4f_2$	Organizing afforestation actions.	**297**	130	91	80	46	26
		44.3	19.4	13.6	11.9	6.9	3.9

Scale: 1- Never; 2- Very rarely: 3- Rarely; 4- Sometimes; 5- Often; 6- Very often.

Table 20: Results of the exploratory factor analysis on the use of various teaching methods in elementary school

Factor loadings

Code	Text	Factor 1	Factor 2	Factor 3	Uniqueness
Q4m$_2$	Organizing activities related to environmental problems in the city	0.90			0.25
Q4n$_2$	Ecological sections	0.88			0.31
Q4o$_2$	Visits to competent institutions	0.78			0.38
Q4i$_2$	Waste recycling	0.72			0.39
Q4l$_2$	Marking important dates for the environment and the community	0.63		-0.32	0.30
Q4f$_2$	Organizing afforestation actions	0.59			0.41
Q4k$_2$	Learning through quizzes and educational games	0.59			0.39
Q4j$_2$	Work involving teachers from different subjects	0.58			0.37
Q4h$_2$	Trips to become familiar with nature	0.46	0.33		0.39
Q4c$_2$	Group work		0.9		0.29
Q4b$_2$	Debate and dialogue between students and teachers		0.7		0.54
Q4e$_2$	Work on projects important to the school and community		0.69		0.32
Q4g$_2$	Presentations and workshops		0.64		0.37
Q4d$_2$	Teaching in the schoolyard		0.41	0.34	0.45
Q4a$_2$	The teacher delivers the lesson, and the students listen				0.96

Legend: The "principal axis factoring" extraction method was used in combination with the "oblimin" rotation.

Further analysis of the importance of using different teaching methods (Table 20), the data matrix shows that the Cronbach's alpha of the instrument was 0.934. Using EFA, three highly correlated factors were singled out and barely correlated with the third factor, which explains a total of 59.1% of the variance (table 20). The correlations between the factors were as follows: r 12 = 0.78; r 13 = 0.18, r 23 = 0.13. The first factor (eigenvalue 5.113; 34.1% of the explained variance) includes interactive teaching methods that are mostly implemented as an extracurricular activity. The second factor (eigenvalue 3.265; 21.77% of explained variance) is interactive methods that are implemented during regular classes. The third factor is the method (eigenvalue = 0.491; 3.28% of explained variance) of teaching in the school yard. Marking important dates for the environment and the community weighs heavily on the first and third factors. The most common method of teaching 'teacher delivers a lesson, students listen' does not load any of the extracted factors at the level > 0.3.

5.2.2. Part 2. Opinions and attitudes of students towards ESD and the importance of elementary school subjects for gaining knowledge about sustainable development

5.2.2.1. The importance of different subjects from elementary school in gaining knowledge about ESD

The results of frequency, measures of central tendencies, and exploratory factorial analysis are presented in Tables 21, 22, and 23.

Table 21: Measures of central tendency of the importance of elementary school subjects in gaining knowledge about ESD. Results are sorted by descending median.

Code	Text	Grades	LH	TLC	N	Miss.	Mean	Med.	Mode	SD
$Q2g_2$	Native language	1-9	41	1382	696	11	4.77	6	6	1.73
$Q2a_2$	Biology	6-9	6	201	697	10	4.47	5	5	1.57
$Q2d_2$	Geography	7-9	5	167	694	13	4.27	5	5	1.59
$Q2j_2$	Mathematics	1-9	36	1212	697	10	4.15	5	6	1.85
$Q2e_2$	Nature	1-3	4	136	696	11	4.09	5	5	1.67
$Q2i_2$	Physical Education	1-9	24	816	696	11	3.84	4	6	1.84
$Q2k_2$	History	6-9	6	201	697	10	3.8	4	5	1.70
$Q2f_2$	Nature and society	4-5	6	204	696	11	3.72	4	5	1.69
$Q2b_2$	Chemistry	7-9	4	130	695	12	3.63	4	5	1.65
$Q2c_2$	Physics	7-9	5	164	696	11	3.34	4	1	1.66
$Q2h_2$	Arts	1-9	12	405	696	11	2.68	3	1	1.46

Scale: 1- Completely unimportant; 2-Fairly unimportant; 3- Slightly important; 4- Medium important; 5- Important; 6- Very important. Legend: Grades – the ones in which subjects are taught; LH - number of classes per week during elementary school; TLC - total number of classes during elementary school; Med - median; SD - standard deviation;

Table 22: Frequencies of the importance of different subjects in gaining knowledge about ESD. The results are sorted in descending order based on the number of respondents rated the item as 6 (6 – Very Important). The highest values are bolded.

Code	Text	Grades	LH	1	2	3	4	5	6
$Q2g_2$	Native language	1-9	41	87	15	43	55	123	**373**
				12.5	2,2	6.2	7.9	17.7	**53.6**
$Q2j_2$	Mathematics	1-9	36	125	40	51	97	154	**230**
				17.9	5,7	7.3	13.9	22.1	**33**
$Q2a_2$	Biology	6-9	6	79	22	37	110	253	**196**
				11.3	3.2	5.3	15.8	26.3	**28.1**
$Q2i_2$	Physical Education	1-9	24	150	34	75	124	146	**167**
				21.6	4.9	10.8	17.8	21	**24**
$Q2e_2$	Nature	1-3	4	104	32	69	136	**205**	150
				14.9	4.6	9.9	19.5	**29.5**	21.6
$Q2d_2$	Geography	7-9	5	89	26	50	115	**273**	141
				12.8	3.7	7.2	16.6	**39.3**	20.3
$Q2k_2$	History	6-9	6	129	37	91	145	**180**	112
				18.5	5.3	13.1	20.8	**25.8**	16.5
$Q2f_2$	Nature and society	4-5	6	129	46	102	138	**175**	106
				18.5	6.6	14.7	19.8	**25.1**	15.2
$Q2b_2$	Chemistry	7-9	4	133	47	99	165	**166**	85
				19.1	6,8	14.2	23.7	**23.9**	12.2
$Q2c_2$	Physics	7-9	5	**165**	59	112	159	137	64
				23.7	8.5	16.1	22.8	19.7	9.2
$Q2h_2$	Arts	1-9	12	**211**	119	155	137	43	31
				30.3	17.1	22.3	19.7	6.2	4.5

Scale: 1- Completely unimportant; 2-Fairly unimportant; 3- Slightly important; 4- Medium important; 5- Important; 6- Very important.
Legend: Grades – the ones in which subjects are taught; LH - number of classes per week during elementary school.

Analyzing data from Table 21, come to more conclusions. The primary conclusion is that teaching the Native language (median = 6; mode = 6) most affects the acquisition of students' knowledge related to sustainable development. Approximately two-thirds of the respondents declared that it was Native language (Table 22) is important or very much important in shaping their understanding of ESD. Native language, they follow Biology, Geography, Mathematics, and Nature, all with modes and medians with meaning "important" (5), and Mathematics even and with 6 (very important). On the contrary the end of the spectrum, it seems that Arts has the smallest influence on the knowledge students have about ESD. Physics is also rated relatively low. The remaining subjects students are in general considered important or moderately important in the contribution of their understanding of ESD.

Table 23: Results of the exploratory factor analysis on the importance of subjects from elementary school

Factor loadings

Code	Text	Factor 1	Factor 2	Factor 3	Uniqueness
$Q2g_2$	Native language	0.86			0.26
$Q2j_2$	Mathematics	0.72			0.34
$Q2i_2$	Physical Education	0.71			0.56
$Q2k_2$	History	0.6			0.43
$Q2d_2$	Geography	0.43	0.43		0.32
$Q2h_2$	Arts	0.34			0.69
$Q2f_2$	Nature and society		0.89		0.19
$Q2e_2$	Nature		0.88		0.18
$Q2b_2$	Chemistry			0.91	0.18
$Q2c_2$	Physics			0.74	0.34
$Q2a_2$	Biology		0.38	0.45	0.53

Legend: The "principal axis factoring" extraction method was used in combination with the "oblimin" rotation.

Further significance analysis of the item data matrix shows that the instrument's Cronbach's alpha was 0.91. Applying EFA, three highly correlated factors were singled out, explaining 63.3% of the variance, which shows the interconnectedness of school programs. The correlations were as follows: r 12 = 0.56; r 13 = 0.63, r 23 = 0.54. The factor loadings of the extracted factors are given in Table 23. The first factor (eigenvalue 2.76; 25.1% of explained variance) includes humanities and social sciences. The second factor (eigenvalue 2.29; 20.8% of explained variance) includes two subjects from lower grades, and the third factor consists of three science subjects taught in upper elementary school grades (eigenvalue = 1.94; 17.6 % of explained variance.

5.2.2.2. Satisfaction with gained knowledge about ESD in different subjects in elementary school

The results of frequency, measures of central tendency, and exploratory factor analysis are presented in Tables 24, 25, and 26.

Table 24: Measures of the central tendency of the level of satisfaction with gained knowledge about ESD in different subjects in elementary school. Results are sorted by descending median.

Code	Text	N	Miss.	Mean	Med.	Mode	SD
$Q3i_2$	Physical Education	679	28	4.87	5	7	2.14
$Q3g_2$	Native language	680	27	4.79	5	7	1.95
$Q3a_2$	Biology	679	28	4.67	5	5	1.75
$Q3d_2$	Geography	679	28	4.59	5	5	1.89
$Q3k_2$	History	679	28	4.48	5	5	2
$Q3j_2$	Mathematics	679	28	4.42	5	5	2.03
$Q3e_2$	Nature	674	33	4.36	5	5	1.92
$Q3f_2$	Nature and society	676	31	4.23	5	5	1.97
$Q3h_2$	Arts	676	31	4.12	4	5	2.03
$Q3b_2$	Chemistry	679	28	3.93	4	5	1.69
$Q3c_2$	Physics	678	29	3.71	4	5	1.88

Scale: 1-Completely dissatisfied; 2-Fairly dissatisfied; 3-Slightly satisfied; 4-Moderately satisfied; 5- Satisfied; 6-Very satisfied; 7-Completely satisfied. Legend: Med.-median; SD-standard deviation.

Table 25: Frequencies of satisfaction with gained knowledge about ESD in different subjects from elementary school. The results are sorted according to the decreasing number of respondents on item 6 (6- Very important). The highest values are bolded.

Code	Text	1	2	3	4	5	6	7
$Q3i_2$	Physical Education	105	23	44	57	131	89	**230**
		15.5	3,4	6.5	8.4	19.3	13.1	**33.9**
$Q3g_2$	Native language	89	16	45	96	151	121	**162**
		13.1	2,4	6.6	14.1	22.2	17.8	**23.8**
$Q3k_2$	History	108	32	40	102	**170**	94	133
		15.9	4.7	5.9	15	**25**	13.8	19.6
$Q3j_2$	Mathematics	119	19	62	96	**155**	99	129
		17.5	2.8	9.1	14.1	**22.8**	14.6	19
$Q3a_2$	Biology	74	15	51	96	**238**	94	111
		10.9	2,2	7.5	14.1	**35.1**	13.8	16.3
$Q3h_2$	Arts	131	36	69	106	**160**	67	107
		19.4	5.3	10.2	15.7	**23.7**	9.9	15.8
$Q3d_2$	Geography	95	23	47	71	**209**	131	103
		14	3,4	6.9	10.5	**30.8**	19.3	15.2
$Q3e_2$	Nature	107	24	61	104	**185**	93	100
		15.9	3.6	9.1	15.4	**27.4**	13.8	14.8
$Q3f_2$	Nature and society	120	30	58	116	**164**	94	94
		17.8	4,4	8.6	17.2	**24.3**	13.9	13.9
$Q3b_2$	Chemistry	128	50	74	121	**176**	56	74
		18.9	7.4	10.9	17.8	**25.9**	8.2	10.9
$Q3c_2$	Physical education	144	51	99	110	**163**	63	48
		21.2	7.5	14.6	16.2	**24**	9.3	7.1

Scale: 1-Completely dissatisfied; 2-Fairly dissatisfied; 3-Slightly satisfied; 4-Moderately satisfied; 5- Satisfied; 6-Very satisfied; 7-Completely satisfied.

After reviewing the data Table 24, concludes that all measures of central tendencies indicate students' satisfaction with all subjects included in the research. No subject stands out as a source of complete dissatisfaction, and examining the frequency values (Table 25) also makes it evident that Physical Education and the Native language received the highest number of positive responses (mode value is 7). On the other hand, the least satisfaction with the knowledge of ESD comes from Physics, with one-fifth of the respondents expressing complete dissatisfaction.

Table 26: Results of the exploratory factor analysis of satisfaction with knowledge gained about ESD from various subjects in elementary school

Factor loadings

	Text	Factor 1	Factor 2	Factor 3	Uniqueness
$Q3e_2$	Nature	0.98			0.08
$Q3f_2$	Nature and society	0.84			0.18
$Q3d_2$	Geography	0.47	0.31		0.34
$Q3a_2$	Biology	0.45		0.43	0.45
$Q3i_2$	Physical Education		0.87		0.33
$Q3h_2$	Arts		0.59		0.43
$Q3g_2$	Native language		0.57		0.35
$Q3k_2$	History		0.52		0.38
$Q3j_2$	Mathematics		0.52	0.46	0.33
$Q3b_2$	Chemistry			0.84	0.26
$Q3c_2$	Physics			0.74	0.33

Legend: The "principal axis factoring" extraction method was used in combination with the "oblimin" rotation.

A further analysis of satisfaction with acquired knowledge about ESD in different subjects was done. Inspection of the data matrix shows that the instrument's Cronbach's alpha was 0.934. Using EFA, three highly correlated factors were singled out, explaining 68.5% of the variance (table 26). The correlations between the factors were as follows: 12 = 0.61; *r* 13 = 0.63, *r* 23 = 0.63. The first factor (eigenvalue 2.65; 24.1% of explained variance) consists of two social science subjects from early grades followed by Geography and Biology (which significantly load the third factor). The second factor (eigenvalue 2.62; 23.8% of explained variance) is humanities subjects and Mathematics. The third factor consists of two scientific subjects studied in the final grades of elementary school (eigenvalue = 2.26; 20.6% of explained variance), as well as Mathematics, which significantly loads the second factor, and Biology also loads the first factor.

5.2.2.3. Opinions and attitudes about greater inclusion of ESD content in teaching

Results of frequency, measures of central tendency, and exploratory factorial analysis are presented in Tables 27, 28, and 29.

Table 27: Measures of central tendency for opinions and attitudes toward greater inclusion of ESD content in teaching. The results are sorted in descending order of mean.

Code	Positive attitudes	N	Miss.	Mean	Med.	Mode	SD	Negative attitudes
$Q5d_2$	Easy for teachers to implement.	640	67	4.25	4	4	1.84	Difficult for teachers to realize.
$Q5h_2$	Important for my further education.	641	66	4.2	4	4	1.94	Unimportant for my further education.
$Q5e_2$	Easy for students to learn.	640	67	4.17	4	4	1.91	Difficult for students to learn.
$Q5c_2$	Interesting.	642	65	4.12	4	4	1.98	Boring.
$Q5f_2$	Important for the whole society.	642	65	4.09	4	4	2.07	Unimportant to society.
$Q5i_2$	Important for future generations.	641	66	4.06	4	7	2.12	Irrelevant for future generations.
$Q5b_2$	Necessary.	641	66	4.06	4	4	1.88	Needlessly.
$Q5a_2$	Useful.	646	61	4.03	4	4	1.9	Useless.
$Q5g_2$	Important for students.	641	66	4.02	4	7	2.05	Unimportant to students.
$Q5l_2$	Important for survival on Earth.	638	69	3.92	4	1	2.19	Irrelevant to survival on Earth.
$Q5j_2$	Important for a healthy environment.	640	67	3.92	4	7	2.17	Unimportant for a healthy environment.
$Q5k_2$	Important for human health.	639	68	3.9	4	1	219	Unimportant for human health.

Legend: Miss.-missing; Med.-median; SD-standard deviation.

Table 28: Frequency of attitudes toward greater inclusion of ESD content in teaching. The results are sorted in descending order based on the number of respondents for item 1 (1 - complete agreement with positive attitudes toward ESD content). The highest values are bolded.

Code	Positive attitudes	1	2	3	4	5	6	7	Negative attitudes
$Q5l_2$	Important for survival on Earth	**140**	66	68	115	70	41	**138**	Irrelevant to survival on Earth
		21.9	10.3	10.7	18	11	6.4	**21.6**	
$Q5k_2$	Important for human health	**138**	66	82	112	54	50	**137**	Irrelevant to human health
		21.6	10.3	12.8	17.5	8.5	7,8	**21.4**	
$Q5j_2$	Important for a healthy environment	**132**	70	74	123	54	54	**133**	Unimportant for a healthy environment
		20.6	10.9	11.6	19.2	8.4	8.4	**20.8**	
$Q5f_2$	Important for the whole of society	106	64	74	**137**	76	54	**131**	Unimportant to society
		16.5	10	11.5	**21.3**	11.8	8.4	**20.4**	
$Q5i_2$	Important for future generations	103	83	78	118	61	62	**136**	Irrelevant for future generations
		16.1	12.9	12.2	18.4	9.5	9.7	**21.2**	
$Q5g_2$	Important for students	**97**	81	88	**117**	87	46	**125**	Unimportant to students
		15.1	12.6	13.7	**18.3**	13.6	7.2	**19.5**	
$Q5a_2$	Useful	86	61	99	**152**	97	49	102	Useless
		13.3	9.4	15.3	**23.5**	15	7.6	15.8	
$Q5c_2$	Interesting	85	65	97	**134**	84	55	**122**	Boring
		13.2	10.1	15.1	**20.9**	13.1	8.6	**19**	
$Q5b_2$	Necessary	73	65	116	**140**	96	47	104	Needlessly
		11.4	10.1	18.1	**21.8**	15	7.3	16.2	
$Q5e_2$	Easy for students to learn.	65	75	99	**134**	90	65	112	Difficult for students to learn.
		10.2	11.7	15.5	**20.9**	14.1	10.2	17.5	
$Q5h_2$	Important for my further education	65	79	93	**139**	80	59	**126**	Unimportant for my further education
		10.1	12.3	14.5	**21.7**	12.5	9.2	**19.7**	
$Q5d_2$	Easy for teachers to implement	63	50	105	**149**	102	60	111	Difficult for teachers to realize
		9.8	7,8	16.4	**23.3**	15.9	9.4	17.3	

The overview data presented in Table 27 reveals a few findings. Medians have got value 4, means range from 3.90 to 4.20, which indicates the neutral position of these two measures of central tendencies. Better insight is possible to acquire analysis frequencies answers (Table 28). The frequency distribution shows that at the top of the table are three items with means slightly below the central point, and the number of respondents with strongly opposing views is nearly equal ($Q5k_2$, $Q5j_2$, $Q5l_2$) regarding the (non)important of ESD for human health, a healthy environment, and survival on Earth. At the bottom the end tables there are opinions in which more student believes that ESD is boring, difficult to learn, and unimportant for future schooling and yes teachers have got obstacles in implementation the curriculum of the ESD program.

Table 29: Results of exploratory factorial analysis of attitudes towards greater inclusion of ESD content in teaching

Factor loadings

	Text	Factor 1	Factor 2	Uniqueness
$Q5c_2$	Interesting-Boring	0.91		0.3
$Q5e_2$	Easy for students to master - Difficult for students to master	0.86		0.3
$Q5a_2$	Useful-Useless	0.85		0.27
$Q5b_2$	Necessary-Unnecessary	0.85		0.26
$Q5d_2$	Easy for teachers to implement - Difficult for teachers to implement	0.76		0.49
$Q5h_2$	Important for my further education - Not important for my further education	0.73		0.33
$Q5g_2$	Important for students - Not important for students	0.62		0.23
$Q5f_2$	Important for the whole society-Unimportant for society	0.56	0.36	0.23
$Q5k_2$	Important for human health-Unimportant for human health		0.95	0.12
$Q5j_2$	Important for a healthy environment-Not important for a healthy environment		0.92	0.11
$Q5l_2$	Important for survival on Earth-Not important for survival on Earth		0.9	0.22
$Q5i_2$	Important for future generations-Unimportant for future generations	0.38	0.55	0.22

Legend: The "principal axis factoring" extraction method was used in combination with the "oblimin" rotation.

By further analyzing the significance of attitudes towards greater inclusion of ESD content in teaching, the data matrix shows that Crobach's alpha of the instrument was 0.964. Applying EFA, two highly correlated factors were singled out, explaining 74.4% of the variance. The factor loadings are given in Table 29. The first factor (eigenvalue 5.41; 45.1% of the explained variance) includes items about the interest, necessity, and importance of ESD for the future of students. The second factor (eigenvalue 3.52; 29.3% of explained variance) included items about the importance of ESD for survival at the global level, as well as the life of future generations.

5.3. Results of research conducted among first-year students (target group 3).

The results are presented in two parts. In the first part, students' familiarity with ESD content and the most commonly used teaching methods during high school were presented and interpreted. The second part of the results gives an insight into the opinions and attitudes of students towards ESD. In both parts, some segments concern the comparative analysis of answers from students who have completed different types of high schools (gymnasium and four-year vocational high schools).

Answers were collected from 513 students, and 404 of them declared which type of school they attended (Table 30). Later, in the analyzes of the differences between the types of schools, we excluded 7 students who finished school abroad, so the final number was 397.

Table 30: Frequency of the type of high school completed by first-year students

Code	Text	N	N%
$Q8a_3$	Gymnasium in Montenegro	211	52.2
$Q8b_3$	Four-year high vocational school in Montenegro	186	46
$Q8c_3$	High school abroad	7	1.7

From the data shown in Table 30, can be concluded that the distribution of students who answered this question (which was the last in the questionnaire) is almost perfectly balanced between gymnasium and four-year secondary schools, providing valuable material for data comparison.

5.3.1. Part 1. Familiarity of first-year students with ESD content and the most commonly used teaching methods during high school

5.3.1.1. Familiarity with cross-curricular topics (CCTs) of ESD during high school education

The frequency results are presented in Table 31.

Table 31: Frequency of learning about cross-curricular topics (CCTs) of ESD during high school. The results are ordered according to the increasing number of respondents on item 1 (1-I hear about this topic for the first time in this questionnaire). The highest values are bolded.

Code	CCTs	1	2	3	4	5	6	Sum 3+4	Sum of 5+6
$Q2c_3$	Environmental Protection	17	49	**179**	152	40	76	331	116
		3,3	9.6	**34.9**	29.6	7,8	14.8	64.5	22.6
$Q2a_3$	Climate change	34	57	**152**	110	102	58	262	160
		6.6	11.1	**29.6**	21.4	19.9	11.3	51	31.2
$Q2f_3$	Health education	45	100	48	**147**	85	88	195	173
		8.8	19.5	9.4	**28.7**	16.6	17.2	38.2	33.8
$Q2g_3$	Human rights education	47	100	12	**168**	74	112	180	186
		9.2	19.5	2,3	**32.7**	14.4	21.8	35	36.2
$Q2d_3$	Sustainable cities and settlements	**123**	109	24	86	122	49	110	171
		24	21.2	4.7	16.8	23.8	9.6	21.5	33.4
$Q2e_3$	Biodiversity	129	54	**229**	39	40	22	268	62
		25.1	10.5	**44.6**	7.6	7,8	4.3	52.2	12.1
$Q2h_3$	Entrepreneurial learning	159	**127**	7	91	66	63	98	129
		31	**24.8**	1.4	17.7	12.9	12.3	19.1	25.2
$Q2b_3$	Green economy	**165**	112	50	36	112	38	86	150
		32.2	21.8	9.7	7	21.8	7.4	16.4	29.2

Legend: 1-I hear about this topic for the first time in this questionnaire; 2-This topic is only mentioned, but not explained in school; 3-This topic is explained in detail only in biology classes; 4-This topic is explained in detail in several subjects; 5-I only heard about this topic in the media; 6-I learned about this topic independently from available literature.

Analyzing the data shown in Table 31, several conclusions emerge. Firstly, it is noticeable that each of the CCTs excluded a certain number of high school students, ranging

from about 3.3% for the topic of Environmental Protection to 32% for the topics "Green Economy" and "Entrepreneurial Learning". Secondly, the column relates to learning from the media and professional literature (sum of 5 + 6) highlights the importance of structured educational approaches to ESD, as between a fifth and a third of the respondents opted for global current topics acquiring knowledge about Biodiversity, which implies that this path for acquiring knowledge has not been used, so it points to the need to strengthen the paths for acquiring knowledge through formal education is observed in column 2, where the data ranges from a tenth to a quarter of respondents.

The goal of all CCTs being covered in several subjects, because this approach promotes a comprehensive understanding of this topic and is in line with the recommendations of the ESD program, was not achieved. Only three topics (Health Education, Human Rights, and Environmental Protection) reach a level of around 30%, which is not a good indicator. The lowest range of cross-curricular implementation (around 7%) was reported for Biodiversity and Green Economy. Topics that are closely related to the general objectives of the teaching of Biology ($Q2c_3$, $Q2e_3$, and $Q2a_3$) are generally introduced in the context of this course, although they are recommended to be covered in a cross-curricular way. Two circumstances must be emphasized here. The first is that Biology is a compulsory subject in all classes of a general program of gymnasium, but this is not the case with its other programs, and it is even less present in classes in high vocational schools. This further emphasizes the imperative of cross-curricular implementation. Secondly, although the students were precisely asked that the examination refer to experiences from high school, it is possible that a part of the respondents relied on knowledge of ESD in biology from elementary school. Especially if we are talking about students who only had biology for one year with a low amount of lessons, and then the one from elementary school, which is studied for 4 years as a compulsory subject, remained in his memory more.

Familiarity with the topics can therefore be concluded from the sum of the data for options 3 (This topic is explained in detail only in biology classes) and 4 (This topic is explained in detail in several subjects), which show a range of data from the highest for the topic of environmental protection (about three fifths) to the lowest which is one-sixth for the

green economy and one fifth for entrepreneurial learning. For the mentioned two topics with which high school students are the least familiar, about a third of the respondents met for the first time in this questionnaire.

5.3.1.1.1. Differences between students who completed high school in Montenegro and four-year high vocational schools, regarding familiarity with cross-curricular topics from the ESD program

To determine the statistical significance of the differences between gymnasium students and students of high vocational schools, tables 32 and 33 are presented below, which present the results obtained by frequency analysis and the χ^2 test. It included data for 397 students, who declared which high school they graduated from.

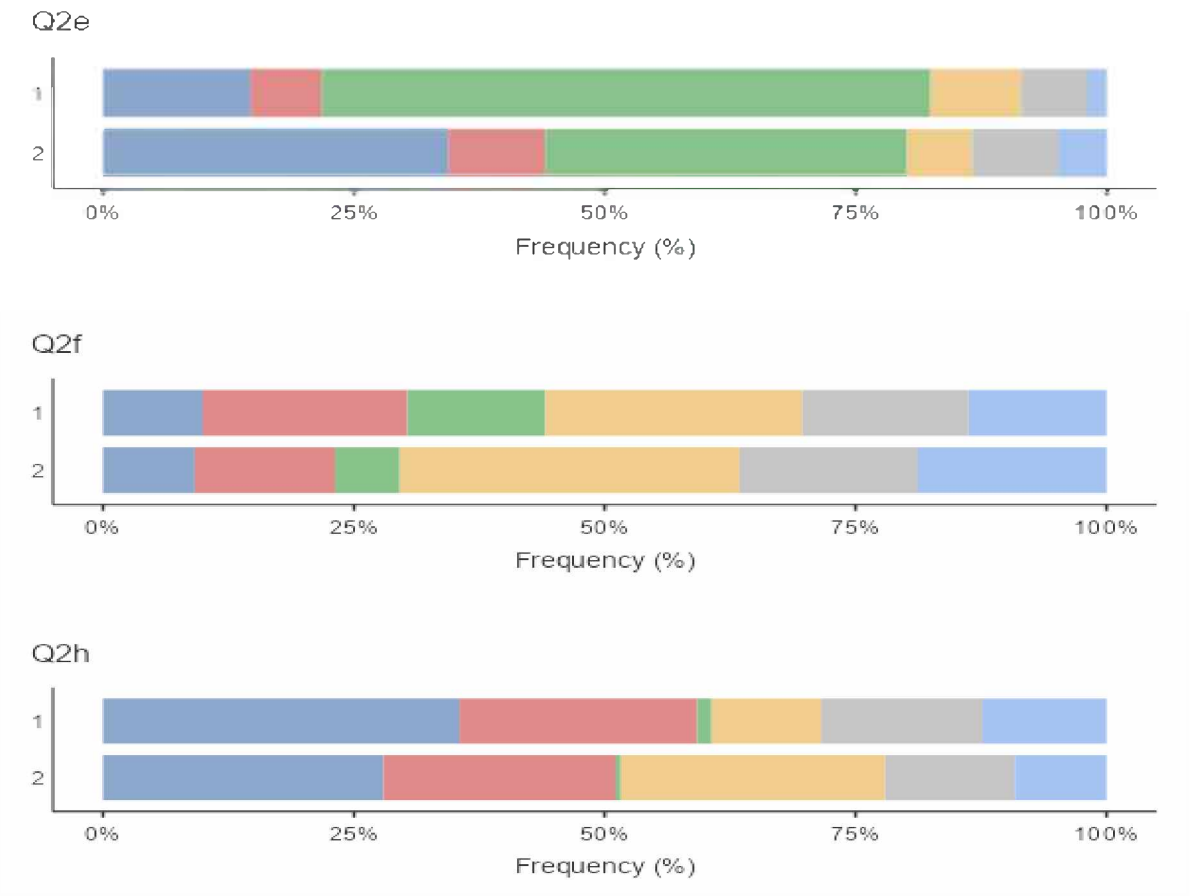
Table 32: Differences in the frequencies of gaining experience with CCTs of ESD program for groups of students who completed gymnasium and four-year high vocational schools in Montenegro

				Frequencies %					
Code	CCTs	Groups	N	1	2	3	4	5	6
$Q2a_3$	Climate changes	1	211	1.5	5.8	15.6	14.1	10.8	5.3
		2	186	2.8	5	16.9	8.3	8.3	5.5
$Q2b_3$	Green economy	1	211	16.6	10.6	7.1	2.5	12.8	3.5
		2	186	14.6	11.1	4	3.8	10.6	2.8
$Q2c_3$	Environmental protection	1	211	1.5	2.8	19.1	18.1	4.3	7.3
		2	186	1.3	5	17.4	13.4	3.8	6
$Q2d_3$	Sustainable cities and settlements	1	211	12.6	13.1	2.5	8.1	12.3	4.5
		2	186	12.1	7.8	2.5	8.3	12.3	3.8
$Q2e_3$	Biodiversity	1	211	7.8	3.8	32.2	4.8	3.5	1
		2	186	16.1	4.5	16.9	3	4	2.3
$Q2f_3$	Health education	1	211	5.3	10.8	7.3	13.6	8.8	7.3
		2	186	4.3	6.5	3	15.9	8.3	8.8
$Q2g_3$	Education about human rights	1	211	5	10.6	1.3	17.9	8.3	10.1
		2	186	4	8.3	0.8	14.4	7.8	11.6
$Q2h_3$	Entrepreneurial learning	1	211	18.9	12.6	0.8	5.8	8.6	6.5
		2	186	13.1	10.8	0.3	12.3	6	4.3

Legend: group 1-students who graduated from gymnasium; group 2-students who graduated from a four-year vocational high school; 1-I am hearing about this topic for the first time in this questionnaire; 2-this topic is only mentioned, but not explained at school; 3-this topic is explained in detail only in the biology classes; 4-this topic is explained in detail in several subjects; 5-I heard about this topic only in the media; 6-I learned about this topic independently from the available literature.

From Table 32, it can be concluded that there is a difference in frequencies among groups for the topics $Q2e_3$ (Biodiversity), $Q2h_3$ (Entrepreneurial Learning), and $Q2f_3$ (Health education).

Following is a graphical representation of the differences in frequencies of the inclusion of cross-curricular themes from the ESD program in high schools between groups of gymnasium students, where the first group graduated from gymnasium (Group 1) and the second group graduated from a four-year vocational high school (Group 2).



Legend: 1-students who finished gymnasium; 2-students who have completed one of the four-year high vocational schools; Frequency (%) = frequency expressed as a percentage

- I am hearing about this topic for the first time in this questionnaire;
- This topic is only mentioned but not explained in school;
- This topic is explained in detail only in the Biology class;
- This topic is explained in detail in several subjects;
- I only heard about this topic in the media;
- I learned about this topic independently from the available literature.

Figure 5: Differences in the frequencies of knowledge $Q2e_3$ (Biodiversity), $Q2h_3$ (Entrepreneurial learning), and $Q2f_3$ (Health education) among students who finished gymnasium and those from four-year high vocational schools

Table 33: Chi-square test measures for groups of students who completed gymnasium and four-year vocational high schools in Montenegro regarding familiarity with cross-curricular topics from the ESD program. The results are sorted in ascending order of *p*-value.

Code	CCTs	χ^2	*df*	*p*
$Q2e_3$	Biodiversity	33	5	< 0.001
$Q2h_3$	Entrepreneurial learning	17.2	5	0.004
$Q2f_3$	Health education	11.4	5	0.043
$Q2a_3$	Climate change	7.61	5	0.179
$Q2c_3$	Environmental Protection	4.97	5	0.419
$Q2b_3$	Green economy	4.51	5	0.479
$Q2d_3$	Reflective cities and settlements	4.08	5	0.537
$Q2g_3$	Human rights education	2.47	5	0.781

Legend: χ^2- chi-square; *df* - degrees of freedom; *p*- p-value.

Table 33 concludes that there are statistically significant differences only in $Q2e_3$ (Biodiversity), $Q2h_3$ (Entrepreneurial learning), and $Q2f_3$ (Health education).

5.3.1.2. Inclusion of ESD content in high school teaching

The results of frequencies, measures of central tendencies, and exploratory factor are presented in Tables 34, 35, and 36.

Table 34: Measures of central tendency of including ESD content in high school teaching. The results are sorted in descending order of mean.

Code	Text	N	Miss.	Mean	Med.	Mode	SD
Q7ai$_3$	Industry as a source of environmental pollution	406	107	3.23	3	1	1.67
Q7ba$_3$	Sexually transmitted diseases	403	110	3.17	3	1	1.66
Q7an$_3$	Significance, composition, and sources of air pollution	402	111	3.11	3	1	1.6
Q7ay$_3$	Respect for diversity, the difference between sex and gender	402	111	3.07	3	1	1.6
Q7az$_3$	Empathy	404	109	3.06	3	1	1.73
Q7bb$_3$	The role of the individual in creating a healthy environment	404	109	3.06	3	1	1.72
Q7ag$_3$	National parks, strict nature reserves, "hot spots", endemics, relics	406	107	3.06	3	1	1.62
Q7ao$_3$	Acid rains and their impact	406	107	3.02	3	1	1.58
Q7au$_3$	Causes of natural disasters	403	110	3.01	3	4	1.39
Q7ah$_3$	Renewable energy sources, and their potential in Montenegro	406	107	2.88	3	1	1.55
Q7ax$_3$	The importance of the sea, sources of pollution, and methods of its protection	404	109	2.87	3	1	1.45
Q7ap$_3$	The importance of rational use of natural resources	402	111	2.86	3	1	1.61
Q7ak$_3$	Sustainable tourism	406	107	2.83	3	1	1.61
Q7bc$_3$	Basic principles of democracy	404	109	2.78	3	1	1.63
Q7ad$_3$	Genetically modified organisms	406	107	2.67	2	1	1.51
Q7am$_3$	Sources of noise and its negative impact on human health	405	108	2.64	2	1	1.56
Q7ab$_3$	Mechanism of climate change	404	109	2.61	2	1	1.4
Q7af $_3$	The multiple values of forest ecosystems	406	107	2.52	2	1	1.44

$Q7as_3$	Sustainable cities, settlements, and rural areas	403	110	2.5	2	1	1.52
$Q7ac_3$	The impact of demographic explosions and pollution on nutrition and agriculture	406	107	2.46	2	1	1.48
$Q7bd_3$	Institutions of the European Union, advantages and disadvantages of Montenegro's entry into the EU	405	108	2.45	2	1	1.58
$Q7al_3$	The importance of waste as a resource	406	107	2.42	2	1	1.45
$Q7aq_3$	The importance of coordination between economic and environmental interest	405	108	2.39	2	1	1.42
$Q7aw_3$	Consequences of unplanned exploitation of rivers and lakes in Montenegro	403	110	2.32	2	1	1.4
$Q7aj_3$	Genetic engineering in biotechnology, gene therapy	406	107	2,2	2	1	1,453
$Q7aa_3$	Principles of sustainable development	406	107	2.12	2	1	1,274
$Q7ae_3$	Organic and integrated agriculture	404	109	2.19	2	1	1,255
$Q7av_3$	Biological hazards	404	109	2.17	2	1	1,573
$Q7at_3$	"Green" traffic	403	110	2.1	1	1	1,518
$Q7ar_3$	Ecoremediation	402	111	1.71	1	1	1,156

Scale: 1-Never; 2-Very rare; 3-Rarely; 4-Sometimes; 5-Often; 6-Very often;

Legend: Miss.-missing; Med.-median; SD-standard deviation;

Table 35: Frequency of inclusion of ESD content in high school teaching. The results are sorted by increasing number of respondents for item 1 (1-Never). The highest values are bolded.

Code	Text	1	2	3	4	5	6
Q7ai3	Industry as a source of environmental pollution	**86** **21.2**	76 18.7	57 14	68 16.7	83 20.4	36 8,9
Q7an3	Significance, composition, and sources of air pollution	**93** **23.6**	68 16.9	53 13.2	95 23.6	65 16.2	26 6.5
Q7ao3	Acid rains and their impact	**99** **24.4**	71 17.5	65 16	89 21.9	56 13.8	26 6.4
Q7ag3	National parks, strict nature reserves, "hot spots", endemics, relics	**100** **24.6**	72 17.7	57 14	81 20	71 17.5	25 6.2
Q7au3	Causes of natural disasters	104 25.8	63 15.6	57 14.1	**105** **26.1**	51 12.7	23 5,7
Q7ah3	Renewable energy sources, and their potential in Montenegro	**107** **26.4**	74 18.2	77 19	80 19.7	44 10.8	24 5.9
Q7bb3	The role of the individual in creating a healthy environment	**107** **26.5**	55 13.6	66 16.3	87 21.5	60 14.9	29 7.2
Q7ba3	Sexually transmitted diseases	**107** **26.6**	53 13.2	57 14.1	83 20.6	57 14.1	46 11.4
Q7az3	Empathy	**110** **27.2**	58 14.4	55 13.6	93 23	55 13.6	33 8.2
Q7ab3	Mechanism of climate change	**117** **29**	94 23.3	75 18.6	73 18.1	38 9.4	7 1.7

Q7a y_3	Respect for diversity, the difference between sex and gender	**117** **29.1**	54 13.6	54 13.4	77 19.2	60 14.9	40 10
Q7ax_3	The importance of the sea, sources of pollution, and methods of its protection	**119** **29.5**	66 16.3	67 16.6	81 20	44 10.9	27 6,7
Q7ap_3	The importance of rational use of natural resources	**122** **30.3**	65 16.2	61 15.2	78 19.4	54 13.4	22 5.5
Q7ak_3	Sustainable tourism	**125** **30.8**	64 15.8	73 18	70 17.2	48 11.8	26 6.4
Q7bc_3	Basic principles of democracy	**127** **31.4**	64 15.8	71 17.6	82 20.3	33 8.2	27 6,7
Q7ad_3	Genetically modified organisms	**132** **32.5**	75 18.6	59 14.5	89 21.9	36 8,9	15 3.7
Q7af_3	The multiple values of forest ecosystems	**132** **32.5**	99 24.4	61 15	70 17.2	33 8.1	11 2.7
Q7am_3	Sources of noise and its negative impact on human health	**139** **34.3**	76 18.8	59 14.6	73 18	38 9.4	20 4.9
Q7as_3	Sustainable cities, settlements, and rural areas	**153** **38**	76 18.9	53 13.2	77 19.1	27 6,7	17 4.2
Q7ac_3	The impact of demographic explosions and pollution on nutrition and agriculture	**157** **38.7**	74 18.2	63 15.5	70 17.2	28 6.9	14 3,4
Q7aq_3	The importance of coordination between economic and environmental interest	**157** **38.8**	76 18.8	76 18.8	62 15.3	22 5.4	12 3
Q7al_3	The importance of waste as a resource	**161** **39.7**	67 16.5	70 17.2	71 17.5	27 6,7	10 2.5
Q7ae_3	Organic and integrated agriculture	**162** **40.1**	101 25	64 15.8	58 14.4	16 4	3 0.7
Q7bd_3	Institutions of the European Union,	**170**	56	68	66	29	16

	advantages and disadvantages of Montenegro's entry into the EU	**42**	13.8	16.8	16.3	7.2	4
Q7aw 3	Consequences of unplanned exploitation of rivers and lakes in Montenegro	**178** **44.2**	68 16.9	47 11.7	79 19.6	21 5.2	10 2.5
Q7aa3	Principles of sustainable development	**180** **44.3**	92 22.7	64 15.8	49 12.1	16 3.9	5 1,2
Q7aj3	Genetic engineering in biotechnology, gene therapy	**196** **48.3**	71 17.5	49 12.1	55 13.5	22 5.4	13 3.2
Q7av3	Biological hazards	**198** **49**	62 15.3	56 13.9	59 14.6	22 5.4	7 1.7
Q7at3	"Green" traffic	**205** **50.9**	64 15.9	66 16.4	37 9.2	19 4.7	12 3
Q7ar3	Ecoremediation	**263** **65.4**	51 12.7	43 10.7	34 8.5	7 1.7	4 1

Scale: 1-Never; 2-Very rare; 3-Rarely; 4-Sometimes; 5-Often; 6-Very often;

Already at first sight, it is clear that in almost all the items offered, the highest values are precisely those that show that students have never encountered them during their high school education. The range of these frequencies goes from about a fifth (Industry as a source of environmental pollution; Significance, composition, and sources of air pollution), up to half (Biological hazards; "Green" traffic) and two-thirds of respondents (Ecoremediation). Certainly, the results do not allow the conclusion that ESD contents are implemented cross-curricularly, as recommended.

Table 36: Results of exploratory factor analysis of the frequency of inclusion of ESD content in high school

Factor loadings

	Factor				
Code	1	2	3	4	Uniqueness
Q7az$_3$	0.86				0.33
Q7ba$_3$	0.81				0.35
Q7bb$_3$	0.74				0.23
Q7ai$_3$	0.72				0.38
Q7bc$_3$	0.63				0.44
Q7bd$_3$	0.52				0.49
Q7au$_3$	0.52				0.27
Q7ax$_3$	0.49	0.31			0.29
Q7ao$_3$	0.47				0.32
Q7an$_3$	0.42			0.38	0.25
Q7ar$_3$		0.77			0.41
Q7at$_3$		0.73			0.37
Q7as$_3$		0.61			0.28
Q7aq$_3$		0.6			0.31
Q7av$_3$		0.51	0.33		0.38
Q7aw$_3$		0.50			0.40
Q7al$_3$		0.5			0.39
Q7aa$_3$		0.44			0.5
Q7am$_3$		0.37			0.46
Q7ad$_3$			0.83		0.31
Q7aj$_3$			0.68		0.41
Q7ae$_3$			0.67		0.38
Q7af$_3$			0.62		0.33
Q7ac$_3$			0.59		0.35
Q7ab$_3$			0.49		0.38
Q7ai$_3$			0.35	0.48	0.26
Q7ah$_3$				0.46	0.37
Q7ak$_3$		0.34		0.39	0.44
Q7ag$_3$			0.37	0.37	0.33
Q7ap$_3$				0.35	0.29

Legend: The "principal axis factoring" extraction method was used in combination with the "oblimin" rotation. See Table 35 for codes.

Further analysis of the frequency of inclusion of ESD content in teaching, the data matrix shows that Crobach's alpha of the instrument was 0.973. Applying EFA (table 36), four factors were identified that explain 64.43% of the variance. The first factor (eigenvalue 6.29; 20.96% variance) includes topics about the role of the individual for a healthy environment, empathy, and sexually transmitted diseases; The second factor (eigenvalue 5.28; 19.59% variance) includes principles of sustainable development, noise sources and consequences of river exploitation; The third factor (eigenvalue 5.06; variance 16.87) includes topics about genetically modified organisms, the mechanism of climate change and the advantages of Montenegro joining the EU; The fourth factor (eigenvalue 2.7; variance 9.01) includes topics about the importance of natural resources and the potential of Montenegro for renewable energy sources.

5.3.1.2.1. Differences between students who completed gymnasium and four-year high vocational schools in Montenegro, regarding the frequency of inclusion of ESD content in teaching

To determine the statistical significance of the differences between high school students and students of high vocational schools, tables 37 and 38 are presented below, in which the Mann-Whitney test was performed.

Table 37: Measures of the Mann-Whitney test for groups of students who completed gymnasium and four-year vocational high schools in Montenegro regarding the frequency of including ESD content in teaching. The results are sorted in ascending order by *p*-value.

Code	*U*	*p*	r_{rb}
Q7ad$_3$	15140	< 0.001	0.22431
Q7aj$_3$	15067	< 0.001	0.22805
Q7bd$_3$	16528	0.008	0.14857
Q7af$_3$	16629	0.009	0.14802
Q7ab$_3$	16616	0.014	0.13996
Q7ae$_3$	16760	0.014	0.13722
Q7ap$_3$	16489	0.016	0.13779
Q7ac$_3$	16917	0.017	0.13324
Q7ba$_3$	16810	0.028	0.12575
Q7ag$_3$	17255	0.042	0.11595
Q7ao$_3$	17372	0.054	0.10995
Q7au$_3$	17228	0.070	0.10343
Q7ax$_3$	17422	0.085	0.09824
Q7bc$_3$	17423	0.086	0.09758
Q7av$_3$	17595	0.101	0.08929
Q7av$_3$	17595	0.101	0.08929
Q7ah$_3$	18226	0.246	0.06620
Q7am$_3$	18267	0.292	0.05961
Q7aw$_3$	18156	0.320	0.05511
Q7ai$_3$	18501	0.363	0.05211
Q7aq$_3$	18586	0.447	0.04255
Q7al$_3$	18692	0.449	0.04230
Q7an$_3$	18427	0.468	0.04166
Q7bb$_3$	18638	0.537	0.03533
Q7at$_3$	18613	0.561	0.03136
Q7ak$_3$	18939	0.602	0.02964
Q7ay$_3$	18563	0.618	0.02862

Code	*U*	*p*	r_{rb}
Q7as 3	18901	0.772	0.01634
Q7az3	19095	0.839	0.01165
Q7ar3	19037	0.917	0.00517
Q7aa3	19455	0.954	0.00323

Legend: *U* = Mann Whitney *U*; *p* = p value; r_{rb} = rank biserial correlation. See Table 35 for codes.

Table 37 shows that for the first 10 items, the *p-value* is <0.05, which shows that there are statistically significant differences and that the largest is for the first two items (genetically modified organisms; genetic engineering in biotechnology; gene therapy) in which *p* <0.001. Even in the examples where the differences are statistically significant, r_{rb} values do not exceed the limits of negligible and weak correlations.

Table 38: Measures of central tendency for groups of students who graduated from gymnasium and four-year high vocational schools in Montenegro, regarding the frequency of inclusion of ESD content in teaching. Results are sorted by descending median.

Code	Groups	N	Mean	Med.	SD
Q7ba$_3$	1	209	3.33	4	1.67
	2	184	2.97	3	1.75
Q7ax$_3$	1	210	2.96	3	1.56
	2	184	2.72	3	1.63
Q7ay$_3$	1	210	3.09	3	1.71
	2	182	3.01	3	1.75
Q7az$_3$	1	210	3.04	3	1.63
	2	184	3.07	3	1.70
Q7bb$_3$	1	210	3.08	3	1.60
	2	184	2.99	3	1.65
Q7ag$_3$	1	211	3.22	3	1.63
	2	185	2.88	3	1.59
Q7ah$_3$	1	211	2.94	3	1.53
	2	185	2.77	3	1.55
Q7ak$_3$	1	211	2.82	3	1.48
	2	185	2.82	3	1.76
Q7an$_3$	1	209	3.14	3	1.55
	2	184	3.02	3	1.65
Q7ai$_3$	1	211	3.28	3	1.63
	2	185	3.14	3	1.71
Q7ao$_3$	1	211	3.14	3	1.55
	2	185	2.85	3	1.59
Q7au$_3$	1	210	3.12	3	1.55
	2	183	2.84	3	1.58
Q7ap$_3$	1	209	3.01	3	1.61
	2	183	2.63	2	1.58
Q7bc$_3$	1	211	2.89	3	1.60
	2	183	2.63	2	1.58
Q7ab$_3$	1	210	2.76	3	1.44
	2	184	2.41	2	1.34
Q7ad$_3$	1	211	2.92	3	1.54
	2	185	2.34	2	1.41
Qac$_3$	1	211	2.57	2	1.46

Code	Groups	N	Mean	Med.	SD
	2	185	2.26	2	1.47
Q7ae3	1	210	2.33	2	1.30
	2	185	2.02	2	1.18
Q7af3	1	211	2.69	2	1.48
	2	185	2.29	2	1.35
Q7al3	1	211	2.31	2	1.34
	2	185	2.46	2	1.51
Q7am3	1	210	2.52	2	1.49
	2	185	2.72	2	1.63
Q7aa3	1	211	2.09	2	1.22
	2	185	2.13	2	1.32
Q7aq3	1	211	2.39	2	1.39
	2	184	2.31	2	1.41
Q7aw3	1	210	2.37	2	1.42
	2	183	2.26	2	1.49
Q7as3	1	210	2.44	2	1.40
	2	183	2.49	2	1.61
Q7at3	1	210	2.04	2	1.25
	2	183	2.08	1	1.49
Q7av3	1	210	2.24	2	1.37
	2	184	2.05	1	1.40
Q7bd3	1	211	2.61	2	1.52
	2	184	2.25	1	1.53
Q7aj3	1	211	2.45	2	1.49
	2	185	1.87	1	1.30
Q7ar3	1	208	1.69	1	1.14
	2	184	1.66	1	1.10

Legend: Group 1 – students who finished gymnasium; Group 2 - students who completed a four-year high vocational school; Med.- median; SD - standard deviation.

In the data in Table 38, for almost half of the items, the importance of biology (median 3) for the acquisition of ESD content is highlighted, but also the informative rather than formative role of education in high school (for half of the items, the median is 2). In terms of cross-curricular implementation, only the topic of sexually transmitted diseases stands out (median 4). Although these are students who graduated from different high schools, no significant difference in results is noticeable.

5.3.1.3. Using different teaching methods in high school

The results of frequency, measures of central tendencies, and exploratory factor analysis are presented in Tables 39, 40, and 41.

Table 39: Measures of central tendencies of using different teaching methods in high school. Results are sorted by descending median.

Code	Text	N	Miss.	Mean	Med.	Mode	SD
$Q5a_3$	Teacher delivers a lesson, and students listen.	456	57	4.92	5	6	1.21
$Q5b_3$	Debate and dialogue between students and teachers.	456	57	3.23	3	2	1.4
$Q5g_3$	Presentations and workshops.	454	59	3.17	3	2	1.5
$Q5c_3$	Group work.	455	58	3.15	3	4	1,3
$Q5e_3$	Work on projects important to the school and community.	454	59	2.52	2	1	1.36
$Q5l_3$	Marking important dates for the environment and the community.	453	60	2.5	2	1	1.44
$Q5k_3$	Learning through quizzes and educational games.	455	58	2.39	2	2	1.29
$Q5n_3$	Ecological sections.	454	59	2.17	2	1	1.35
$Q5h_3$	Trips to becamo familiar with nature.	454	59	2.16	2	1	1,3
$Q5m_3$	Organizing environmental activities regarding problems in the town.	454	60	2.11	2	1	1,3
$Q5j_3$	Work involving teachers from different subjects.	454	59	2.01	2	1	1.24
$Q5f_3$	Organizing afforestation actions.	455	58	2.01	1	1	1.26
$Q5o_3$	Visits to competent institutions.	454	59	1.93	1	1	1.20
$Q5d_3$	Teaching in the schoolyard.	453	60	1.88	1	1	1.19
$Q5i_3$	Waste recycling.	453	60	1.72	1	1	1.18

Scale: 1-Never; 2-Very rare; 3- Rarely; 4-Sometimes; 5-Often; 6-Very often.
Legend: Miss.-missing; Med.-median SD-standard deviation;

Table 40: Frequency of using different teaching methods in high school. The results were sorted by increasing the number of respondents to item 1 (1-Never). The highest values are bolded.

Code	Text	1	2	3	4	5	6	1+2	5+6
$Q5a_3$	Teacher delivers the lesson, and the students listen.	6 1,3	21 4.6	29 6.4	81 17.8	128 28.1	**191** **41.9**	27 5.9	319 70
$Q5b_3$	Debate and dialogue between students and teachers.	51 11.2	**112** **24.6**	90 19.7	108 23.7	73 16	22 4.8	163 35.8	95 20.8
$Q5c_3$	Group work.	56 12.3	94 20.7	107 23.5	**135** **29.7**	50 11	13 2.9	150 15	63 13.9
$Q5g_3$	Presentations and workshops.	71 15.6	**111** **24.4**	67 14.8	105 23.1	74 16.3	26 5,7	182 40	100 22
$Q5k_3$	Learning through quizzes and educational games.	136 29.9	**146** **32.1**	74 16.3	65 14.3	28 6.2	6 1,3	282 62	34 7.5
$Q5e_3$	Work on projects important to the school and community.	**138** **30.4**	110 24.2	86 18.9	78 17.2	36 7.9	6 1,3	248 54.6	42 9.2
$Q5l_3$	Marking important dates for the environment and the community.	**153** **33.8**	112 24.7	55 12.1	87 19.2	35 7.7	11 2,4	265 58.5	46 10.1
$Q5h_3$	Trips to became familiar with nature.	**196** **43.2**	106 23.3	68 15	54 11.9	26 5,7	4 0.9	302 66.5	30 6.6
$Q5n_3$	Ecological sections.	**204** **44.9**	96 21.1	67 14.8	52 11.5	29 6.4	6 1,3	300 66	35 7.7
$Q5m_3$	Organizing activities regarding environmental problems in the town.	**214** **47.2**	87 19.2	71 15.7	54 11.9	24 5.3	3 0.7	301 66.4	27 6
$Q5j_3$	Work involving teachers from different subjects.	**223** **49.1**	97 21.4	68 15	44 9.7	18 4	4 0.9	320 70.5	22 4.9
$Q5f_3$	Organizing afforestation actions.	**229** **50.3**	93 20.4	60 13.2	49 10.8	21 4.6	3 0.7	322 70.7	24 5.5
$Q5o_3$	Visits to competent institutions.	**134** **51.5**	99 21.8	61 13.4	41 9	15 3,3	4 0.9	233 73.3	19 4.2
$Q5d_3$	Teaching in the schoolyard.	**245** **54.1**	96 21.2	59 13	33 7.3	16 3.5	4 0.9	341 75.3	20 4,4
$Q5i_3$	Waste recycling.	**292** **64.5**	74 16.3	36 7.9	28 6.2	20 4,4	3 0.7	366 80.8	48 10.6

Scale: 1-Never; 2-Very rare; 3- Rarely; 4-Sometimes; 5-Often; 6-Very often.

After reviewing the data in Tables 39 and 40, several key observations emerge. Traditional teaching methods, which involve a teacher delivering a lesson while students passively listen ($Q5a_3$), were often used during high education. This is supported by the value of mode 6. Interactive teaching methods and forms of teaching in which students have contact with nature and the possibility of developing awareness for it was applied "rarely", "very rarely" or "never". This confirms the median and mode values of 1 and 2 for most items.

To summarize the most frequent teaching methods used in the inclusion of ESD content, it will be best seen from the sum of columns 5 (often) and 6 (very often). From these data, it can be seen that the most frequent method is the teacher delivering the lesson and the students listening (70%), presentations and dialogue between teachers and students around a fifth, while all other methods are around a tenth or even less. Visits to competent institutions and classes in the schoolyard are the least frequent (about 4%). On the other hand, the least frequently used methods are obtained by the sum of columns 1 (never) and 2 (Very rarely), which clearly shows that these are the methods of teaching in the schoolyard and waste recycling the least often (about 60%).

Table 41: Results of exploratory factor analysis of the use of different teaching methods in high school

Factor loads

	Factor			
	1	**2**	**3**	**Uniqueness**
$Q5m_3$	0.86			0.21
$Q5n_3$	0.82			0.29
$Q5l_3$	0.74			0.36
$Q5o_3$	0.53			0.51
$Q5k_3$	0.40	0.35		0.44
$Q5c_3$		0.85		0.29
$Q5g_3$		0.69		0.36
$Q5b_3$		0.6		0.53
$Q5e_3$		0.56		0.3 3
$Q5i_3$			0.72	0.42
$Q5f_3$			0.50	0.38
$Q5d_3$			0.48	0.54
$Q5h_3$			0.47	0.47
$Q5j_3$		0.32	0.35	0.44
$Q5a_3$				0.98

Legend: The "principal axis factoring" extraction method was used in combination with the "oblimin" rotation. See Table 40 for codes.

Further analysis of the use of different teaching methods, the data matrix shows that Crobach's alpha of the instrument was 0.924. Using EFA, three highly correlated factors were singled out, which explains a total of 56.4% of the variance. The first factor (eigenvalues 3.33; variance 22.2%) includes interactive teaching methods that are mostly implemented as an extracurricular activity. The second factor (eigenvalue 2.94; 19.6% of variance) is interactive methods that are implemented during regular classes. The third factor consists of methods (eigenvalue 2.19; 14.6% of variance) that provide students with direct contact with nature. It should be noted that the first and second factors are influenced by the method of learning through a quiz, while the second and third factors include work involving teachers from several subjects.

5.3.1.3.1. Measures of the Mann-Whitney test for groups of students who graduated from gymnasium and four-year high vocational schools in Montenegro, regarding the use of different teaching methods in high school

To determine the statistical significance of the differences between gymnasium students and students of high vocational schools, Tables 42 and 43 are presented below, in which the Mann-Whitney test was performed.

Table 42: Measures of the Mann-Whitney test for groups of students who graduated from gymnasium and four-year high vocational schools in Montenegro, regarding the use of different teaching methods in high school. The results are sorted by increasing values of p.

Code	U	p	r_{rb}
$Q5a_3$	16134	0.002	0.16886
$Q5n_3$	17043	0.025	0.12265
$Q5d_3$	17520	0.076	0.09375
$Q5k_3$	17638	0.086	0.09630
$Q5c_3$	17995	0.169	0.07803
$Q5l_3$	17909	0.195	0.07303
$Q5m_3$	17978	0.238	0.06438
$Q5b_3$	18535	0.377	0.05034
$Q5f_3$	18747	0.460	0.03948
$Q5i_3$	18682	0.503	0.03305
$Q5g_3$	19072	0.760	0.01751
$Q5e_3$	19137	0.802	0.01419
$Q5o_3$	19315	0.925	0.00502
$Q5h_3$	19329	0.928	0.00497
$Q5j_3$	19379	0.966	0.00237

Legend: U - Mann Whitney U; p -p-value; r_{rb} -rank biserial correlation. See Table 40 for codes.

Table 43: Measures of central tendency for groups of students who completed gymnasium in Montenegro and four-year vocational secondary schools regarding the use of various teaching methods. The results are sorted in descending order by median.

Code	Group	N	Mean	Med.	SD
$Q5a_3$	1	211	5.15	5	1.05
	2	184	4.73	5	1.33
$Q5b_3$	1	211	3.13	3	1.39
	2	185	3.26	3	1.42
$Q5c_3$	1	211	3.01	3	1.21
	2	185	3.18	3	1.36
$Q5g_3$	1	211	3.17	3	1.51
	2	184	3.14	3	1.53
$Q5e_3$	1	211	2.48	2	1.41
	2	184	2.49	2	1.34
$Q5l_3$	1	210	2.49	2	1.38
	2	184	2.36	2	1.46
$Q5k_3$	1	211	2.41	2	1.26
	2	185	2.21	2	1.24
$Q5h_3$	1	210	2.09	2	1.22
	2	185	2.09	2	1.26
$Q5m_3$	1	210	2.10	2	1.27
	2	183	1.97	1	1.22
$Q5n_3$	1	210	2.26	2	1.38
	2	185	1.98	1	1.28
$Q5j_3$	1	210	2.03	1	1.28
	2	185	1.98	2	1.18

Code	Group	N	Mean	Med.	SD
$Q5f_3$	1	211	1.97	1	1.21
	2	185	1.90	1	1.21
$Q5i_3$	1	210	1.75	1	1.22
	2	184	1.65	1	1.10
$Q5d_3$	1	209	1.95	1	1.24
	2	185	1.74	1	1.09
$Q5o_3$	1	211	1.89	1	1.16
	2	184	1.88	1	1.17

Legend: Group 1 - students who graduated from gymnasium; Group 2 - students who graduated from four - year high vocational school; Med.- median; SD - standard deviation.

Tables 42 and 43 show that there is a statistically significant difference between the groups only in items $Q5a_3$ (the teacher delivers the lesson, students listen) and $Q5n_3$ (environmental sections). Both were more often used by students who finished gymnasium. For the other methods offered, the answers do not differ at the group level. Even in the examples where the differences are statistically significant, r_{rb} values do not exceed the limits of weak correlations.

5.3.2. The second part of the results gives insight into the opinions and attitudes of high school graduates toward ESD

5.3.2.1. The importance of different high school subjects in gaining knowledge about ESD

The results of frequencies and measures of central tendency are given in Tables 44 and 45.

Table 44: Measures of central tendency for the importance of high school subjects in gaining knowledge about ESD. The results are sorted in descending order by median.

Code	Text	N	Miss.	Mean	Med.	Mode	SD
$Q3b_3$	Biology	483	30	4.83	5	5	1.22
$Q3d_3$	Geography	485	28	4.28	5	5	1.69
$Q3k_3$	Native language	485	28	4.15	5	6	1.97
$Q3f_3$	Psychology	482	31	4.08	5	6	1.8
$Q3e_3$	Sociology	485	28	3.92	4	5	1.78
$Q3h_3$	History	485	28	3.7	4	5	1.74
$Q3i_3$	Physical Education	485	28	3.67	4	1	1.9
$Q3a_3$	Chemistry	486	27	3.33	4	1	1.64
$Q3j_3$	Mathematics	483	30	3,3	4	1	1.95
$Q3c_3$	Physics	482	31	3.12	3	1	1.62
$Q3g_3$	Philosophy	484	29	3.07	3	1	1.64

Scale: 1-Completely unimportant; 2-Failrly unimportant; 3-Slightly important; 4-Medium important; 5-Important; 6-Very important. Legend: Med.-median; SD-standard deviation.

Table 45: Frequencies of the importance of different subjects from high school in acquiring knowledge about ESD. The results are sorted according to the decreasing number of respondents on item 6 (6- Very important). The highest values are bolded.

Code	Text	1	2	3	4	5	6
$Q3k_3$	Native language	100	30	34	42	92	**187**
		20.6	6.2	7	8.7	19	**38.6**
$Q3b_3$	Biology	18	8	38	62	**197**	160
		3.7	1.7	7.9	12.8	**40.8**	33.1
$Q3f_3$	Psychology	85	28	35	80	122	**132**
		17.6	5.8	7.3	16.6	25.3	**27.4**
$Q3d_3$	Geography	73	12	40	74	**154**	132
		15.1	2.5	8.2	15.3	**31.8**	27.2
$Q3i_3$	Physical Education	**122**	26	55	78	96	108
		25.2	5.4	11.3	16.1	19.8	22.3
$Q3e_3$	Sociology	90	31	49	84	**125**	106
		18.6	6.4	10.1	17.3	**25.8**	21.9
$Q3h_3$	History	**95**	28	85	86	102	89
		19.6	5.8	17.5	17.7	21	18.4
$Q3j_3$	Mathematics	**143**	43	49	92	84	72
		29.6	8,9	10.1	19	17.4	14.9
$Q3g_3$	Philosophy	**129**	59	92	97	66	41
		26.7	12.2	19	20	13.6	8.5
$Q3a_3$	Chemistry	**117**	30	89	115	95	40
		24.1	6.2	18.3	23.7	19.5	8.2
$Q3c_3$	Physics	**128**	47	89	110	73	35
		26.6	9.8	18.5	22.8	15.1	7.3

Legend: 1-Completely unimportant; 2-Fairly unimportant; 3-Slightly important; 4-Medium important; 5-Important; 6-Very important.

Analyzing the findings presented in Tables 44 and 45, several conclusions can be drawn. The primary conclusion is that the teaching of Biology (Mean=4.83; median=5; mode=5) has the greatest impact on students' acquisition of knowledge related to sustainable development. About three-quarters of respondents stated that Biology (Table 45) was important or very important in shaping their understanding of ESD. It is followed by Geography, Native language, and Psychology with modes of 6 (very important) and medians of 5 (important). At the opposite end of the spectrum, Philosophy and Physics seem to have the least impact on students' knowledge of ESD as they received the lowest scores.

5.3.2.1.1. Differences between students who completed gymnasium and four-year high vocational schools in Montenegro, regarding the importance of different subjects from high school in acquiring knowledge about ESD

To determine the statistical significance of the differences between gymnasium students and students of high vocational schools, tables 46 and 47 are presented below, in which the Mann-Whitney test was performed.

Table 46: Measures of the Mann-Whitney test for groups of students who finished gymnasium and four-year high vocational schools in Montenegro, regarding the importance of different subjects from high school in acquiring knowledge about ESD. The results are sorted by increasing values for p.

Code	U	p	r_{rb}
$Q3b_3$	16355	0.004	0.1580
$Q3i_3$	16892	0.014	0.1392
$Q3k_3$	17107	0.022	0.1282
$Q3e_3$	17356	0.042	0.1156
$Q3f_3$	17239	0.048	0.1126
$Q3g_3$	17420	0.058	0.1080
$Q3a_3$	17874	0.117	0.0892
$Q3j_3$	18196	0.261	0.0638
$Q3d_3$	18325	0.275	0.0617
$Q3c_3$	18208	0.308	0.0582
$Q3h_3$	18852	0.551	0.0341

Legend: U - Mann Whitney U; p - p-value; r_{rb} -rank biserial correlation. See Table 45 for codes.

Table 47: Measures of central tendency for groups of students who completed high school and four-year high vocational schools in Montenegro, regarding the importance of different subjects in acquiring knowledge about ESD. Results are sorted by descending median.

Code	Group	N	Mean	Med.	SD
$Q3a_3$	1	211	3.41	4	1.69
	2	186	3.17	3	1.61
$Q3b_3$	1	210	5.07	5	1.03
	2	185	4.71	5	1.26
$Q3c_3$	1	209	3.12	3	1.62
	2	185	2.97	3	1.58
$Q3d_3$	1	210	4.16	5	1.74
	2	186	4.28	5	1.77
$Q3e_3$	1	211	3.71	4	1.81
	2	186	4.05	5	1.77
$Q3f_3$	1	210	3.84	4	1.83
	2	185	4.16	5	1.85
$Q3g_3$	1	210	2.86	3	1.68
	2	186	3.16	3	1.61
$Q3h_3$	1	211	3.58	4	1.78
	2	185	3.70	4	1.75
$Q3i_3$	1	211	3.32	4	1.87
	2	186	3.76	4	1.95
$Q3j_3$	1	209	3.07	3	1.84
	2	186	3.30	4	1.88
$Q3k_3$	1	211	3.83	5	2.03
	2	186	4.24	5	1.99

Legend: Group 1 - students who graduate from gymnasium; Group 2 - students who graduate from four-year high vocational school; Med.- median; SD - standard deviation.

From the value of p shown in Table 46, it is concluded that there is a difference between the groups for the items $Q3b_3$ (Biology), $Q3i_3$ (Physical Education), $Q3k_3$ (Native

Language). According to the mean value, it can be seen that Biology is more important for gymnasium students, while for those who have completed high vocational schools, Physical Education and Native language are more important. Other subjects have no statistically significant differences between the groups. Even in the examples where the differences are statistically significant, r_{rb} values do not exceed the limits of weak correlations.

5.3.2.2. The level of satisfaction of first-year students with different subjects in high school, which concern coordinated environmental, economic, and social development

The results of measures of central tendency and exploratory factor analysis are presented in Tables 48 and 49.

Table 48: Measures of central tendency for the level of satisfaction with knowledge gained from various high school subjects related to integrated ecological, economic, and social development. The results are sorted in descending order by median.

Code	Text	N	Miss.	Mean	Med.	Mode	SD
$Q4b_3$	Biology	465	48	4.62	5	5	1.55
$Q4d_3$	Geography	465	48	4.1	4	5	1.9
$Q4k_3$	Native language	465	48	3.34	5	1	2.15
$Q4h_3$	Physical education	465	48	3.99	4	1	2.23
$Q4i_3$	History	464	49	3.91	4	1	2.03
$Q4e_3$	Sociology	465	48	3.8	4	1	1.92
$Q4f_3$	Psychology	464	49	3.76	4	1	2.02
$Q4j_3$	Mathematics	466	47	3.43	4	1	1.95
$Q4g_3$	Philosophy	464	49	3.18	3	1	1.92
$Q4a_3$	Chemistry	466	47	3.11	3	1	1.77
$Q4c_3$	Physics	464	49	3.02	3	1	1.72

Scale: 1-Completely dissatisfied; 2-Fairly unsatisfied; 3-Slightly satisfied; 4-Moderately satisfied; 5-Satisfied; 6-Very satisfied; 7-Completely satisfied.
Legend: SD-standard deviation; Med.-median.

From table 48, it can be concluded that the respondents are most satisfied with the teaching of Biology and Geography, which is confirmed by all measures of central tendency. Student satisfaction with other subjects is almost uniform, with a pronounced uniform value of the mode, which for all other subjects is 1 (completely dissatisfied), but also medians 3 and 4 (slightly and moderately satisfied).

Table 49: Results of the exploratory factor analysis of the degree of satisfaction with gained knowledge about ESD from various subjects in high school

Factor loadings

	Factor				
	1	**2**	**3**	**4**	**Uniqueness**
$Q4i_3$	0.77				0.32
$Q4h_3$	0.71				0.42
$Q4k_3$	0.67				0.28
$Q4d_3$	0.62				0.33
$Q4f_3$		0.93			0.19
$Q4e_3$		0.71			0.24
$Q4g_3$		0.66			0.38
$Q4c_3$			0.75		0.27
$Q4a_3$			0.72		0.36
$Q4b_3$			0.48		0.76
$Q4j_3$			0.33	0.53	0.21

Legend: The "principal axis factoring" extraction method was used in combination with the "oblimin" rotation. See Table 48 for codes.

Further analysis of the use of different teaching methods, the data matrix shows that Crobach's alpha of the instrument was 0.915. Applying EFA, four correlated factors were identified, which explains a total of 65.66% of the variance. The first factor (eigenvalues 2.543; variance 23.12%) includes humanity sciences. In the second factor (eigenvalue 2.248; 20.42% of variance) are social sciences. The third factor consists of natural sciences (eigenvalue 1.869; 16.99% of the variance). The fourth factor consists only of mathematics, which is also represented in the third factor.

5.3.2.2.1. Differences between students who completed gymnasium and four-year high vocational schools in Montenegro, regarding the level of satisfaction with different subjects from high school, which concern coordinated environmental, economic, and social development

To determine the statistical significance of the differences between gymnasium students and students of high vocational schools, tables 50 and 51 are presented below, in which the Mann-Whitney test was performed.

Table 50: Measures of the Mann-Whitney test for groups of students who completed gymnasium and four-year vocational high schools in Montenegro, regarding their level of satisfaction with various high school subjects related to integrated ecological, economic, and social development. The results are sorted in ascending order by *p*-value.

Code	*U*	*p*	r_{rb}
Q4h$_3$	16060	0.003	0.16874
Q4g$_3$	16085	0.004	0.16292
Q4b$_3$	16168	0.005	0.15914
Q4c$_3$	16747	0.024	0.12903
Q4a$_3$	16886	0.034	0.12123
Q4k$_3$	18193	0.310	0.05833
Q4j$_3$	18206	0.313	0.05766
Q4e$_3$	18193	0.350	0.05385
Q4d$_3$	18570	0.499	0.03885
Q4f$_3$	18978	0.822	0.01300
Q4i$_3$	19046	0.870	0.00947

Legend: *U* - Mann Whitney *U*; *p* -p-value; r_{rb} -rank biserial correlation. See Table 48 for codes.

Table 51: Differences between measures of central tendency for groups of students who completed gymnasium and four-year vocational high schools in Montenegro regarding satisfaction with various high school subjects related to acquiring knowledge about ESD. The results are sorted in descending order by median.

Code	Group	N	Mean	Med.	SD
$Q4b_3$	1	209	4.88	5	1.44
	2	184	4.47	5	1.56
$Q4k_3$	1	210	4.13	5	2.25
	2	184	4.39	5	2.15
$Q4h_3$	1	210	3.58	4	2.21
	2	184	4.25	5	2.25
$Q4d_3$	1	210	3.99	4	1.90
	2	184	4.10	4	1.94
$Q4e_3$	1	209	3.63	4	1.92
	2	184	3.83	4	1.91
$Q4f_3$	1	209	3.63	4	1.97
	2	184	3.70	4	2.07
$Q4i_3$	1	209	3.78	4	2.08
	2	184	3.84	4	2.02
$Q4j_3$	1	210	3.45	4	1.99
	2	184	3.24	3	1.96
$Q4c_3$	1	209	3.17	3	1.82
	2	184	2.74	3	1.63
$Q4a_3$	1	210	3.26	3	1.88

Code	Group	N	Mean	Med.	SD
	2	183	2.84	3	1.66
$Q4g_3$	1	210	3.33	3	1.99
	2	183	2.77	3	1.74

Legend: Group 1 - students who graduated from gymnasium; Group 2 - students who graduated from four - year high vocational school; Med.- median; SD - standard deviation.

The results show that the greater difference between the groups stands out in items $Q4h_3$ (Physical Education), $Q4g_3$ (Philosophy), and $Q4b_3$ (Biology). Gymnasium students are more satisfied with Biology and Philosophy, while those who completed four-year high vocational schools are more satisfied with Physical Education. Even in the examples where the differences are statistically significant, the r_{rb} values do not exceed the limits of weak correlations.

5.3.2.3. Attitudes of students in the first year of studies towards greater inclusion of ESD in teaching

The results of the frequency, measures of central tendency, and exploratory factor analysis are presented in Tables 52, 53, and 54.

Table 52: Measures of central tendencies of attitudes towards greater inclusion of ESD content in teaching. The results are sorted by descending mean.

Code	Positive attitudes	N	Sun.	AS	Med.	Mode	SD	Negative attitudes
$Q6d_3$	It's easy for teachers to implement	440	73	3.96	4	4	1.91	Difficult for teachers to implement
$Q6h_3$	Important for my further education	440	73	3.86	4	1	2.1	Unimportant for my further education
$Q6c_3$	Interesting	438	75	3.74	3.5	3	2	Boring
$Q6e_3$	Easy for students to learn	441	72	3.65	3	1	2.03	Hard for students to learn
$Q6a_3$	Useful	440	73	3.63	4	1	2.02	Useless
$Q6b_3$	Necessary	438	75	3.45	3	1	2.05	Needlessly
$Q6g_3$	Important for students	442	71	3,4	3	1	2.16	Unimportant to students
$Q6i_3$	Important for future generations	441	72	3,3	3	1	2,3	Irrelevant for future generations
$Q6f_3$	Important for the whole of society	442	71	3.28	3	1	2.22	Unimportant to society
$Q6l_3$	Important for survival on Earth	438	75	3.2	2	1	2.29	Irrelevant to survival on Earth
$Q6j_3$	Important for the healthy environment	440	73	3.19	2	1	2.29	Unimportant for a healthy environment
$Q6k_3$	Important for human health	440	73	3.19	2	1	2.29	Unimportant for human health

Legend: Med.-median; SD-standard deviation;

Table 53: Frequencies of attitudes towards greater inclusion of ESD content in teaching. The results are classified according to the decreasing number of respondents on item 1 (1-complete agreement with positive attitudes towards ESD content). The highest values are bolded.

Code	Positive attitudes	1	2	3	4	5	6	7	Negative attitudes
$Q6l_3$	Important for survival on Earth.	**171**	52	35	52	23	36	69	Irrelevant to survival on Earth.
		39	11.9	8	11.9	5.3	8.2	15.8	
$Q6j_3$	Important for a healthy	**171**	55	38	46	25	34	71	Unimportant for a healthy
	environment.	**38.9**	12.5	8.6	10.5	5,7	7.7	16.1	environment.
$Q6k_3$	Important for human health.	**169**	57	41	44	25	32	72	Unimportant for human health.
		38.4	13	9.3	10	5,7	7.3	16.4	
$Q6i_3$	Important for future generations.	**161**	49	43	47	37	32	72	Irrelevant for future generations.
		36.5	11.1	9.8	10.7	8.4	7.3	16.3	
$Q6f_3$	Important for the whole society.	**146**	67	50	42	35	38	64	Unimportant to society.
		33	15.2	11.3	9.5	7.9	8.6	14.5	
$Q6g_3$	Important for students.	**124**	66	63	54	31	40	64	Unimportant to students.
		28.1	14.9	14.3	12.2	7	9	14.5	
$Q6b_3$	Necessary.	**105**	63	74	70	37	29	60	Needlessly.
		24	14.4	16.9	16	8.4	6.6	13.7	
$Q6a_3$	Useful.	**91**	59	63	91	40	35	61	Useless.
		20.7	13.4	14.3	20.7	9.1	8	13.9	
$Q6e_3$	Easy for students to learn.	**88**	57	78	79	39	36	64	Hard for students to learn.
		20	12.9	17.7	17.9	8.8	8.2	14.5	

Q6h $_3$	Important for my further education.	**84**	48	75	70	40	47	76	Unimportant for my further
		19.1	10.9	17	15.9	9.1	10.7	17.3	education.
Q6d$_3$	Easy for teachers to implement.	79	52	**88**	74	42	38	65	Difficult for teachers to realize.
		18	11.9	**20.1**	16.9	9.6	8.7	14.8	
Q6c$_3$	Interesting.	79	52	**88**	74	42	38	65	Boring.
		18	11.9	**20.1**	16.9	9.6	8.7	14.8	

From Tables 52 and 53, it can be concluded that the medians are 2-4, which can be interpreted as a moderately positive attitude, while the modes for all items are 1 (except Q6d$_3$ and Q6c$_3$), which all taken into account lead to the conclusion that first-year students study expressed a rather positive attitude towards greater inclusion of ESD content in teaching. The only thing is that they did not express a clear opinion on whether these contents are interesting and whether they are easy for teachers to implement.

Further analysis (Table 54) of the importance of attitudes towards greater inclusion of ESD content in teaching, the data matrix shows that Crobach's alpha of the instrument was 0.973. Applying EFA (table 54), two highly correlated factors were singled out, explaining 79.8% of the variance. The first factor (eigenvalue 9.082; 75.68% of explained variance) includes items about interest, necessity, and importance of ESD for students' future. The items Q6j$_3$ (importance for a healthy environment) and Q6k$_3$ (importance for human health) were included in the second factor (eigenvalue 0.494; 4.12% of explained variance).

Table 54: Results of the exploratory factor analysis of attitudes toward greater inclusion of ESD content in teaching

	Factor		
	1	**2**	**Uniqueness**
$Q6g_3$	0.95		0.11
$Q6f_3$	0.93		0.11
$Q6b_3$	0.93		0.17
$Q6i_3$	0.92		0.12
$Q6a_3$	0.91		0.2
$Q6c_3$	0.86		0.28
$Q6j_3$	0.85	0.33	0.06
$Q6k_3$	0.84	0.35	0.068
$Q6e_3$	0.84		0.32
$Q6l_3$	0.82		0.17
$Q6h_3$	0.81		0.36
$Q6d_3$	0.75		0.46

Legend: The extraction method "principal axis factoring" was used in combination with "oblimin" rotation. See Table 52 for codes.

Further analysis of attitudes towards greater inclusion of ESD content in teaching, the data matrix shows that Crobach's alpha of the instrument was 0.973. Using EFA, two correlated factors were singled out, which explains a total of 79.8% of the variance. The first factor (eigenvalues 9.082; variance 76.58%) includes almost all items, while the second (eigenvalue 0.494; 4.12% variance) includes two items on the importance of ESD for a healthy environment and human health.

5.3.2.3.1. Differences between students who completed gymnasium and four-year high vocational schools in Montenegro, regarding to attitudes towards greater inclusion of ESD content in teaching

To determine the statistical significance of the differences between gymnasium students and students of high vocational schools, tables 55 and 56 are presented below, in which the Mann-Whitney test was performed.

Table 55: Measures of Mann-Whitney test for groups of students who completed gymnasium and four-year vocational high schools in Montenegro regarding attitudes toward greater inclusion of ESD content in teaching. The results are sorted in ascending order by *p*-value.

Code	*U*	*p*	r_{rb}
$Q6b_3$	17881	0.271	0.06363
$Q6l_3$	18118	0.364	0.05122
$Q6e_3$	18466	0.450	0.04356
$Q6d_3$	18711	0.650	0.02623
$Q6j_3$	18868	0.687	0.02274
$Q6h_3$	18768	0.696	0.02258
$Q6f_3$	19109	0.784	0.01561
$Q6g_3$	19186	0.839	0.01164
$Q6c_3$	18789	0.845	0.01137
$Q6a_3$	19059	0.888	0.00812
$Q6i_3$	19226	0.932	0.00489
$Q6k_3$	19216	0.934	0.00471

Legend: *U*- Mann Whitney *U*; *p*- p-value; r_{rb} -rank biserial correlation See Table 52 for codes.

From Table 55 it can be concluded that there is no statistically significant difference between the groups and all r_{rb} are negligible. Also, table 56 confirms that differences between groups are negligible in all items.

Table 56: Differences between measures of central tendency for groups of students who completed gymnasium and four-year high vocational schools in Montenegro, regarding to greater inclusion of ESD content in teaching. Results are sorted by descending median.

Code	Group	N	Mean	Med.	SD
$Q6h_3$	1	211	3.85	4	2.15
	2	182	3.93	4	2.06
$Q6d_3$	1	210	3.95	4	1.89
	2	183	4.05	4	1.89
$Q6a_3$	1	210	3.69	3	2.06
	2	183	3.63	4	2.02
$Q6e_3$	1	210	3.79	3	2.04
	2	181	3.73	4	1.97
$Q6c_3$	1	210	3.79	3	2.04
	2	181	3.73	4	1.97
$Q6b_3$	1	211	3.62	3	2.09
	2	181	3.38	3	2.03
$Q6g_3$	1	211	3.40	3	2.22
	2	184	3.41	3	2.12
$Q6i_3$	1	210	3.33	3	2.35
	2	184	3.25	3	2.22
$Q6f_3$	1	211	3.27	2	2.27
	2	184	3.33	3	2.20
$Q6l_3$	1	211	3.11	2	2.35
	2	181	3.27	3	2.25
$Q6j_3$	1	211	3.13	2	2.33
	2	183	3.22	2	2.29
$Q6k_3$	1	211	3.17	2	2.35
	2	183	3.15	2	2.27

Legend: Group 1 - students who graduated from gymnasium; Group 2 - students who graduated from four-year high vocational school; Med.- median; SD - standard deviation.

6. DISCUSSION

The discussion was organized in a way that the findings of each study were first analyzed, and then followed by their comparison to propose measures that could contribute to improving the quality of education for sustainable development in Montenegro. The theoretical basis for conducting the discussion was found in Borton's model of reflective practice (Karunanayaka et al., 2016) answering the questions What? So what? And what now? Due to the objectives of the study, it is difficult to directly compare its findings with references from other countries (Anderson & Jacobson, 2018; Hayk&León, 2021; Ntona et al., 2023) due to the specific context, different curricula, and the Montenegrin school system. However, it can be concluded that the results indicate the need for quick action because some findings can be interpreted as worrying.

6.1. Discussion for research conducted with target group 1 (elementary and high school teachers in Montenegro)

The answers to the research question "How familiar are elementary and high school teachers with ESD?" show that only 15.9% of the respondents are completely familiar with the ESD program, and 23.1% partially. This suggests: that the teacher trainings conducted by the Institute of Education almost ten years ago was not sufficient, or that the training participants did not concentrate on the content presented, and it is possible that they did but did not share their knowledge with the rest of the collective (although they were obliged to do it).

By comparing data between different types of schools, differences are noticeable. The highest level of familiarity is among teachers in elementary school, and the lowest among teachers of high vocational schools. To some extent, it is expected that high vocational schools will have a lower level of familiarity because the teaching training included teachers

of compulsory subjects, and teachers of vocational subjects probably also participated in the survey. On the other hand, it should not be expected because the school management and teachers who were included in the training were obliged to transfer the acquired knowledge to the rest of the team. Nevertheless, the fact that teachers from all types of schools expressed their desire to learn about the ESD program is encouraging. Vocational high schools have the lowest level of information, but also the greatest interest in being informed about the program. Everything indicates that a mandatory measure to improve the level of implementation is the organization of a set of quality teacher trainings in which all elementary and high school teachers will participate, to avoid mistakes and the possibility that someone can say that they are "hearing about this program for the first time". A special emphasis should be placed on high vocational schools because after their completion, most students continue to engage in their chosen profession, so it is precisely in them that awareness of how to live, work and behave following the postulates of sustainable development should be developed. Students from vocational schools prepare for professions that mostly deal with chemicals, various materials, potential pollution, and energy sources. They cannot have a developed awareness of a sustainable lifestyle if they do not shape it during schooling with the help of teachers who are educated about the ESD program and have clear recommendations on how to implement it. It is obvious that Montenegrin teachers do not differ from teachers from other countries and school systems, because all studies related to ESD and sustainable development goals (Anyolo et al., 2018; Iliško et al., 2011) have identified the need for support in the form of education. The difference between countries may be in the opportunities offered. Therefore, we propose the strategy "no teacher is left behind", a concept adopted from the proposal for the inclusion of technology in education (Efaw, 2005), where every teacher should attend a mandatory update course offered by the relevant institutions. Perhaps professional development courses and workshops for the entire collective are the solution, followed by the establishment of common practice (Vangrieken et al., 2017) both in each school and the community of teachers of similar subjects at the national and regional level, not forgetting local sources of knowledge (Moore et al., 2019).

Answers to the research question "How is ESD used in the classroom?" show that only one-fifth of teachers use ESD in teaching, which is not a good result if we assume that it should be widely applied in all subjects and schools in Montenegro. If we compare with the sum of complete and partial familiarity with ESD, which is 39%, it turns out that only about half of them included it in teaching practice, which is an unsatisfactory result. It is particularly worrying that almost 10 years have passed since the training and introduction of this program, which should mean that this program has been domesticated in the teaching practices of at least most teachers if not all of them. There is a noticeable difference between different types of schools. The highest level of program implementation is among teachers in elementary schools, and the lowest among teachers in high vocational schools. As for high vocational schools, the results were expected to some extent because only teachers of compulsory subjects were included in the training, and teachers of vocational subjects also participated in the research, which can be cited as a justification for not being familiar with ESD because their colleagues did not present the contents of the training to them. It is evident that school management and teachers who participated in the training did not take the mandatory implementation of the program and their mandatory presentation of the content to the rest of the collective seriously enough. It is possible that the training was not clear enough and was not supported by examples that would help teachers feel ready to implement the program in regular teaching of their subject. It is difficult to offer clear and immediate solutions, but the new campaign must start immediately, taking into account the barriers in the first phase and the individual needs of each teacher in the second phase, through the establishment of support for teachers and the formation of common practice. Also, the autonomy of the teacher who can choose the course of the lesson must be taken into account, but also teachers must know that they should implement these contents. For all of this to be effective, there must be a supervisory body that will monitor implementation, rather than having a situation where what is on paper is one thing, and what happens in practice is another.

The results of the research question "How familiar are teachers with the methodological instructions for using ESD?" coincide with the results of familiarization with the ESD program. This was expected because the training on ESD programs was followed by

the presentation of methodological instructions for implementation. Also, here too there is a noticeable difference between different types of schools. The highest familiarity is among teachers in elementary school and the lowest among teachers in high vocational schools. This information can be considered unsatisfactory if the main goal of promoting the program was its wide application in all elementary and high schools. It is encouraging that high schools are more interested in learning about these contents, especially in vocational high schools. However, as previously suggested, refresher courses and the establishment of common practices are most likely the solution to the problem. Such expressed interest from high vocational school teachers should be an additional signal that further education is highly desirable and necessary.

If we compare the results of the question "How is ESD used in the classroom?" with the list of cross-curricular topics in Table 7 (question 5 "How often is ESD content used in the classroom?"), we find that teachers are already incorporating some topics that align with the goals of sustainable development without recognizing them as such. First of all, this indicates that teachers are not sufficiently informed about what the sustainable development concept entails and that there is an interdisciplinary ESD program, as evidenced by some teachers not recognizing that the mentioned topics fall within its scope. It proves what was pointed out in the introductory part of the ESD program, which is that most of the goals it contains are in line with the general educational goals that were already present in the subject programs before the formal introduction of the ESD program. All this indicates that the additional education of all teachers is a mandatory measure to increase the scope of implementation. Furthermore, it is not enough to only train teachers and prescribe implementation, but it must be monitored and controlled by the competent institution, which must find a way to implement this very important program if it is to be effective. For now, it seems that ten years ago, teachers were "assigned" to include ESD in the teaching practice, and no one controls whether it was actually implemented.

The sixth question is: "What are teachers' opinions about ESD?". The findings indicate that integrating sustainable development topics into their subject areas is perceived as challenging for both teachers and students. Despite this difficulty, there was a positive outlook

on the benefits of incorporating more ESD content in the classroom. This underscores the notion that achieving sustainable development is a multifaceted goal that necessitates its integration across various subjects. This approach requires substantial support, further highlighting the previously noted sentiment among most respondents that they are unfamiliar with the program and the methodological guidelines for its implementation.

We get a better insight if we analyze the answers to question 7: "What are the reasons for (not) including ESD in teaching?" From the answers, it can be concluded that the teachers recognized the importance of ESD and have a clear opinion that students should acquire this knowledge and skills at an earlier age, not only at the university level. This is very positive data, which implies that teachers recognize the importance of content on sustainable development for young generations. In addition, teachers cited as the main obstacles to the inclusion of ESD: lack of appropriate literature, need for quality training, lack of a competent institution to monitor implementation, insufficient teachers' selaries and lack of teaching aids. Taking the synthesized statements together, we can recognize the pattern of teachers who are not motivated to include ESD in teaching, finding several reasons for the lack of motivation. Even if they believe that ESD is important and should be included in school, they still consider it most desirable that someone else teaches it as a separate subject. This is certainly an indicator that the teacher's attitude is not in accordance with the cross-curricular idea of ESD implementation. Observing the reasons mentioned above and comparing them with the previously highlighted positive attitude and desire to learn about this program, in addition to quality training, it is necessary to accompany them with adequate teaching aids adapted to all subjects in which implementation is expected. Also, it should be clearly indicated in which classes and with which teaching aids implementation is recommended, and then those teaching aids should be made available to schools. In Montenegro, there is no official literature for elementary and high schools that follows the implementation of the contents of the ESD program. This further complicates the preparation for such contents, and also reduces the motivation of even those who would be willing to make an effort and implement the recommended contents. Teacher salary is another point that should not be overlooked, as cross-curricular content requires more extensive teaching preparation. For the teacher to make

an extra effort, he must be motivated accordingly. If for decades the average salary of teachers in elementary and high schools in Montenegro is below the average in the country, there is additional demotivation for any increased effort. On the other hand, low salaries are common knowledge and everyone who starts work in education is familiar with it. Education should be done by people who love that profession, and in no way should material status be decisive. Certainly, one of the types of motivation is the improvement of material status because these are highly educated people who perform a profession that is of crucial importance for every country, so it is inadmissible that their salaries are not in line with that. Regarding all the mentioned obstacles, the opinion of Montenegrin teachers does not differ from those stated in previous studies (Anderson & Jacobson, 2018; Carbach&Fischer, 2017; Anyolo et al., 2018; Iliško et al., 2011; Ntona et al., 2023). Shortening the above list of problems and obstacles related to the implementation of ESD is beyond the voluntary efforts of teachers or individual schools, but the resources and professionals who can solve the problems of teachers must be provided by the state.

Last, but not least, the research question was "Which teaching methods are most common in the classroom?". The reason for seeking answers was the widely accepted conclusion among scholars that only active methods can lead to the desired outcomes of ESD (Howell, 2021; UNESCO, 2020), not only to inform students about the topic but also to change their attitudes to be proactive citizens (Cottafava et al., 2019; O'Flaherty & Liddy, 2018; Sinakou et al., 2019).

The results show that in elementary and high schools in Montenegro when, the most common work methods are those that exclude students from being in nature. Previous research has shown that active teaching methods give the best results when it comes to training practical skills, the social sphere, and the permanent connection of students with nature through the experience of socializing and socializing while learning in nature (Cooper et al., 2000; Grant, R. 1997; Kern 1986; Lavie A., 2015). Ecological sections and ecological actions, which are recommended as a convenient way to develop students' awareness and habits related to sustainable development, were found to be rare in this study. Possible reasons for these results are lack of motivation of teachers, lack of teaching materials, too many

students in classes, refusal of parents to let their children participate in environmental actions, lack of time due to the overload of the curriculum, and concern for the safety of students outside. Also, it must be emphasized that basic education is free and that visits to competent institutions or the purchase of any teaching material require the financial support of the student's parents or the school. A potential limitation for more frequent implementation of such teaching methods is the lack of the mentioned financial support. For participating in environmental actions, a possible limitation is the potential political connotation in which teachers do not want to involve themselves or their students (especially since minors are educated in elementary and high schools). If we really want to achieve a wide cross-curricular implementation of the ESD program, it is necessary to connect students with nature as much as possible and to awaken their love and sense of responsibility towards it. Otherwise, it is unrealistic to expect them to grow into adults who are aware of the far-reaching effects that humans can have on nature, and on the other hand, they will not realize that they can easily live in harmony with it.

In short, following the paths of Heberlein (2012), we can conclude that at the systemic level, the ESD curriculum has been introduced in the entire pre-tertiary education, but it seems that the information about its existence has not even reached all educators, which is why a campaign is needed at least to raise awareness of its existence. At the technological level, it is recognized that teachers need teaching materials and resources, which requires their provision and availability, with appropriate training. On a cognitive level, teachers do not seem to oppose ESD in their teaching practice, but recognize the numerous obstacles to doing it successfully, not at the expense of their existing teaching responsibilities or even their expansion. So, if the goal of the Government (Ministry of Education) is to enrich curricula with cross-curricular ESD programs, then the "let it happen" approach is a sure path to failure. Implementation "on paper" cannot be the solution, especially not for such a long-term essential cross-curricular area.

Limitations of the study arise from the research methodology because the respondents were self-selected (Elston, 2021) and because the majority of the total number of teachers did not participate in the research. We can only guess that they had the same experiences and

opinions and behaved in accordance with those who took part in the survey. Also, there are frequent surveys in which the instrument is a questionnaire, so despite anonymity, respondents give answers without reading the questions in detail, but also resort to socially desirable answers. Based on the answers, it could be concluded that they were sincere, considering that in many segments they were not socially desirable. However, it is impossible to compensate for this possible weakness of the study design. We can only speculate about the generalization of the results to the entire population of teachers, as well as the transferability of the results to the international field and to higher levels of education.

6.2. Conclusions and discussion and research of target group 2 (students of the first grade of high schools in Montenegro)

When preparing the discussion, we faced the challenge that the results of this study cannot be directly compared with international studies, because the Montenegrin ESD curriculum is somehow unique, although the idea of ESD is integrated into many educational systems (Rauch, 2002). Another problem was that the references that show some similarity to this study mostly cite the results of studies at the university level and very rarely at the elementary or high school level (Šorgo & Kamenšek, 2012). Even when the populations are matched, the focus is different (Boeve-de Pauw et al., 2015). Not very helpful in categorizing the results is the diversity of school systems, where the years of elementary school before diversification in different directions can be of different lengths, from 4 years (e.g. in the Czech Republic or Germany) to 9 years as in Slovenia or Montenegro (see the Euridice website for details).

The first strength and first limitation of the study is its novelty, so it can be considered a pioneering work in the field in question. The instruments used have not yet been tested in an international context. Therefore, the answers (especially in the second part of the study) may reflect only the local dimension. One can only assume whether they can be applied to other population groups that did not participate in the research. Another limitation is a general one that applies to all studies of this type, and that is the self-selection of respondents.

The discussion is divided into two parts.

6.2.1. Familiarity of first-grade high school students with ESD content and the most commonly used teaching methods during elementary school education

Interpretation of the data from question 1 ("How did you find out about the mentioned topics related to sustainable development?") shows that 5 out of 8 topics from the ESD program are implemented in several subjects (by 28-41% of respondents), which is in line with recommended approach (Van den Branden, 2012). From the point of view of these five topics (Environmental protection; Health education; Climate change; Human rights education; Sustainable cities and settlements), these are optimistic results, but in three topics (Biodiversity; Green economy; Entrepreneurial learning) reasons and limitations should be found that they prevent cross-curricular implementation.

Only three topics (Health Education, Human Rights and Environmental Protection) reach the level of around 40%. Biodiversity and Green Economy are at the end of the range and close to 10%. The situation can be recognized as somewhat better for topics that are closely related to the general objectives of the teaching of Biology (Biodiversity and Environmental Protection) and are mainly introduced in the context of this subject. Despite the intention that all ESD topics are covered in an interdisciplinary manner, students mostly encounter these topics within the Biology curriculum. Familiarity with ESD topics can therefore be concluded by the sum of respondents who opted for number 3 (This topic is explained in detail only in Biology classes) and 4 (This topic is explained in detail in several subjects), which show that the highest familiarity is about three a quarter of the students for the topics Environmental Protection and Biodiversity, and the lowest is about one fifth for Entrepreneurial Learning. Students during their elementary school years are the least familiar with the concepts of Entrepreneurial Learning and Green Economy. About two-fifths of respondents encountered the mentioned topics for the first time in this questionnaire, which is a worrying figure. The interpretation of this result can be summarized by the statement of Silajdžić et al. (2015) that the Government and educational institutions do not recognize their role and do not support the development of green entrepreneurship. The results are worrying in combination with the data from Table 14 that self-education is not an alternative source of support (columns 5 and 6). They highlight the discrepancy between the intended curriculum and its actual implementation, a problem documented in the literature (Penuel et al., 2007).

This observation underscores the imperative for a more thorough integration of all the cross-curricular topics outlined in the ESD curriculum, especially since enough time has passed for the implementation to take root. It implies an essential need for continuous training of teaching staff to guarantee the effective and sustainable application of ESD within the curriculum. It was realistic to expect a significant representation of all cross-curricular topics, given that seven years have passed since their mandatory inclusion in all subjects in elementary school. It turns out that the training that was carried out before the implementation may have been insufficiently clear or not comprehensive. Alternatively, it is possible that teachers are not adequately prepared or willing to incorporate these contents, despite being informed of their mandatory nature. The compulsory curriculum may be overly burdensome, leaving teachers with limited time to devote to cross-curricular content, including ESD. Addressing this issue requires a thoughtful re-evaluation of the mandatory curriculum to reduce the burden on educators. By creating a more balanced curriculum, teachers can be given the necessary time and flexibility to effectively incorporate cross-curricular elements such as ESD, encouraging a more holistic and sustainable approach to education. Also, all teacher training and directives to implement teaching topics are futile if teachers are not motivated and willing to engage with the subject matter. The autonomy of the teacher and the impossibility of thorough monitoring of his work must also be emphasized. Visits to classes by the school administration or the supervisory institution are rare concerning the number of lessons realized per year. These visits are always announced at least a few days in advance, so it is possible to show work in class that does not reflect the real situation that occurs when the teacher is alone with the students. It must also be mentioned that the team for supervising classes and reviewing annual work plans (members of the school administration and the pedagogical-psychological service) are not always competent to assess whether topics on sustainable development have been implemented, but that is why there should be professionals and a supervisory body that will monitor implementation. Also, in every written preparation for the class, something can be written that cannot be verified as to whether it was actually implemented. That's why research, as this dissertation, can be very important as an indicator for necessary actions and changes.

After considering the findings presented in question 6 ("What is the frequency of inclusion of ESD content in elementary school teaching?") it is evident that the topics listed in the ESD curriculum for elementary schools were rarely included ("sometimes" or "rarely" categories). Mode values in most items support this observation. However, there are exceptions where the mode value is 1 (indicating "never"). Particularly noteworthy are certain exceptions related to topics such as the European Union, "Green Economy" and Sustainable Development, where almost a third of students stated that they had never encountered these subjects during their elementary school years. These results emphasize a notable discrepancy between the intended curriculum and its actual application, particularly regarding certain ESD topics that are frequently overlooked or seldom covered in elementary education. Although these findings cannot be directly compared to international data due to differences, they underscore that merely including a topic in the curriculum does not ensure it will be taught to students (Šorgo & Kamenšek, 2012). While the infrequent mention of these topics in classes may not seem overly concerning, given the curriculum's inherent flexibility in implementing ESD themes, it is crucial to highlight instances where a significant number of students reported that specific topics were never addressed. This suggests that ESD content is only partially integrated into the curriculum. Possible reasons for this incomplete implementation could be inadequate teacher training, the burden of mandatory course content, a lack of teaching resources and literature, or insufficient motivation among teachers to make the extra effort to effectively include cross-curricular content.

By analyzing the data from question 4 ("Frequency of using different teaching methods during elementary school"), it is clear that conventional teaching methods (characterized by the teacher delivering the lesson while the students passively listen) prevail during elementary school. This is supported by a mode value of 6, indicating that this approach was frequently used. In contrast, interactive teaching methods, which encourage active student participation, were used less often and generally fell into the "sometimes" or "rare " categories. Notably, alternative teaching methods that include direct actions and interactions with the natural environment were rarely used, as evidenced by a mode value of 1 for all mentioned items, with a median of 2. This suggests a limited incorporation of practical work, empirical approaches in the educational process, indicating to potential areas

for innovation and improvement of pedagogical strategies. The prevalence of traditional teaching methods, together with the rare use of interactive and alternative approaches, indicates a mismatch between current teaching practices and recommended strategies for fostering a holistic and experiential learning environment, as advocated by ESD guidelines. If we consider the widely accepted conclusion among scholars that only active methods can lead to the desired outcomes of ESD (Howell, 2021; UNESCO, 2020), then the gap between that claim and the results of this study is obvious. Teaching methods should be used that not only inform students about the topic but also change their attitudes to be proactive citizens (Cottafava et al., 2019; O'Flaherty & Liddy, 2018; Sinakou et al., 2019). To address this gap, it may be necessary to reevaluate and align teaching methods with the broader educational objectives and principles outlined in the ESD program guidelines. While it is sometimes necessary to employ methods that involve student passivity, it is concerning when such methods predominantly characterize elementary education. The widespread use of traditional teaching methods suggests that students are often passive spectators rather than active participants in their learning. This may be partly due to a lack of technical teaching aids that could support more innovative and engaging methods. However, it is important to note that the absence of technical aids is not the sole factor affecting the development of environmental awareness. Relying on passive learning methods reduces opportunities for meaningful dialogue, problem-solving discussions, and direct interaction with nature, all of which are crucial for fostering a deep understanding of sustainable thinking and living. To cultivate genuine environmental sustainability awareness, it is essential to shift towards more interactive, participatory teaching approaches that emphasize nature-focused learning. These results strongly suggest that the ESD curriculum is not being implemented as planned, despite being in use since 2014. Several potential reasons for these results include inadequate training of teachers to effectively integrate ESD content, lack of necessary teaching aids, teacher overload due to mandatory subject content, and lack of supervision by the school management and competent institutions to ensure the implementation of cross-curricular content. To solve these challenges and improve the current situation, a significant effort is needed to reconstruct the methodological approach to teaching. This includes providing teachers with the teaching aids necessary for effective implementation of ESD content. In addition, comprehensive

training of teachers of all subjects is imperative to ensure that all teachers are proficient in the implementation of ESD goals as outlined in the curriculum. Such measures aim to empower teachers and create an environment conducive to the successful implementation of ESD, fostering a more holistic and sustainable educational experience for students.

6.2.2. Students' attitudes on Education for Sustainable Development

Analysis of the data from question 2 ("The impact of different elementary school subjects on the acquisition of ESD knowledge"), two conclusions can be drawn from the data in Table 21. The first is that the greatest influence on knowledge about ESD is the subjects that are represented in the highest number of lessons per week (Native Language and Mathematics), even though these subjects do not necessarily have content close to the content of ESD. On the other hand, although Biology, Geography, and Nature are represented with a low number of lessons per week, they also have a noticeable impact on students when discussing this area. The explanation can be that these are subjects whose compulsory curriculum is close to the topics from the ESD curriculum, so a significant impact on students was achieved even though the weekly number of lessons is small. Subjects with a higher frequency of teaching, such as Native language and Mathematics (an average of four times a week over nine years), had more opportunities to influence students and incorporate ESD content into their teaching. Other subjects with a low number of lessons per week, and which have a mandatory curriculum that is not close to ESD, can be challenging to implement ESD in regular classes. To achieve a greater impact on students in all subjects, it may be necessary to increase the promotion of extracurricular activities or sections that focus on sustainable development topics in more detail than what regular classes might offer as a viable solution. It is necessary to alleviate the burden of mandatory teaching content across all subjects and to establish comprehensive guidelines for teachers. These guidelines should offer detailed instructions that explain strategies for integrating curriculum that is consistent with the ESD curriculum. By providing clear and practical ideas for implementation, it facilitates more effective inclusion of sustainability principles across the curriculum, empowering teachers to impart key knowledge and skills related to ESD.

Analyzing the data from question 3 ("Students' satisfaction with acquired knowledge of ESD from different subjects in elementary school"), several significant observations are made. Measures of central tendency consistently indicate overall student satisfaction in all subjects covered by the survey. It is noticeable that no one item appears as the primary source of total dissatisfaction. After further consideration of the frequency values, it is obvious that Physical Education and Native language received the most positive responses, which is reflected in the mode value of 7. In contrast, a distinct trend was observed in the field of ESD knowledge within the Physics subject. About a fifth of respondents expressed complete dissatisfaction with their satisfaction with ESD in Physics, which raises a potential concern. This finding highlights the need for targeted improvements in the provision of ESD content within the Physics curriculum to improve student satisfaction and understanding. It is intriguing to note that the findings of this and the previous question are similar, but with the difference that in this case, Physical Education received the highest grade from the students, while in the previous question, it was in the fourth position. It is worth considering that the age of the students and the general preference for Physical Education among elementary school students may have played a role in influencing their responses. This variation highlights the importance of considering contextual factors, such as age and subject preferences when interpreting student feedback and survey results.

After examining the data from question 5 ($Q5_2$-Students' attitudes towards greater inclusion of ESD content in teaching), several significant findings are reached. Knowing the attitudes and opinions of students on these issues is related to their lasting impact and is an important predictor of future behavior. When analyzing the results of this question, it can be generalized that the attitude of the majority of respondents about ESD content is neutral and similar to the documented findings for Biology (the subject where ESD is most often implemented), which is described in international studies as a boring and lifeless subject (Tranter, 2004; Prokop et al., 2007) and that the problem is not in the topics but in the way they are presented in schools (Kletečki et al., 2023). However, certain results are contradictory because, in a many number of items, there is an almost equal number of respondents who agree with opposite views, so it is difficult to discern a clear majority opinion. However, it is crucial to emphasize that the absence of strong, definitive attitudes

about ESD is evident from the maximum frequency values. This lack of clear, majority opinion among 15-year-old students is cause for concern.

A thorough analysis of data from another study reveals a nuanced perspective. When assessing students' familiarity with ESD content within the elementary school curriculum, the results show mixed responses, which indicates a level of variability in their knowledge. Examining the lasting impact of ESD content on students who have completed elementary school, it becomes evident that there is considerable scope for improvement in both the integration of these topics into the curriculum and their effectiveness in shaping students' understanding of sustainable development. Given the undefined attitude of students about the importance of ESD, this finding is of considerable concern. The research respondents represent future generations of academics, engineers, doctors, and parents. Their somewhat hesitant stance on the importance of a balanced approach to economic, social, and environmental development is less than ideal. Their lack of clarity in their views on the importance of ESD increases the urgency of solving and eliminating deficiencies in the implementation of ESD in elementary education, ensuring that students not only come into contact but also deeply understand the principles of sustainable development. There is a clear urgent need to invest in comprehensive teacher training for the effective implementation of ESD and to consider reducing the mandatory educational objectives in all subjects to enable the smooth inclusion of ESD content (Kopnina, 2020).

Furthermore, there is a compelling case for intensifying the ESD content in high schools, since the results from elementary school do not seem particularly encouraging. Integrally interpreting the results of the second research, it can be said that the gap between the planned impact of the ESD curriculum and the actual attitudes and perceptions of students is highlighted. Addressing this discrepancy requires a comprehensive reevaluation of curriculum implementation strategies, potentially requiring adjustments to better align with the desired outcomes of fostering sustainability awareness and thinking among students.

The data from this part of the research can be compared with the trend of poor results from year to year of students of this age on PISA tests (Examination Center, 2015; Nikolić et al., 2019; PISA, 2022; oecd.2022), but also with the trend of increasing the number of recipients the "Luča" diploma, which is awarded to students who had the highest grades in all

subjects during their nine-year elementary schooling (Ministry of Education, 2023). From the PISA results, it could be concluded that we cannot expect a high awareness of sustainable development from these students, relying on unenviable results in the field of scientific competencies. On the other hand, interpreting the improvement in the general success of students in elementary school and the increase in the number of "Luča" diploma recipients, it should imply that they have advanced competencies in this area. This illogical discrepancy should raise many questions, which combined with the results from this dissertation, could lead to answers that would improve the educational process, or at least find out what led to such data.

6.3. Discussion of the research of target group 3 (students in the first year of studies in faculties in Montenegro)

Regardless of the numerous literature researching sustainable development at different levels of education, the results of this study cannot be directly compared with international studies because the Montenegrin ESD curriculum is somehow unique, although the idea of ESD is integrated into many educational systems (Rauch, 2002). Second, the references that show some similarity mostly state the results of studies at the university level, and very rarely at the high school level (Šorgo & Kamenšek, 2012). This study can be considered a pioneer research on this topic in Montenegro. Since the majority of the total number of first-year students did not participate, the answers (especially in the second part of the study) can only be guessed as to whether they can be applied to other population groups that did not participate in the research. Another limitation is a general one that applies to all studies of this type, and that is the self-selection of respondents.

The discussion is divided into two parts.

6.3.1. Familiarity of first-year students with ESD content and the most commonly used teaching methods during high education

After considering the findings presented in question 2 ("How did you find out about sustainable development topics?") it is noticeable that the goal of all cross-curricular topics (CCTs) being implemented in several subjects was not achieved. Only three topics—Health Education, Human Rights, and Environmental Protection—achieve approximately 30% cross-curricular implementation. This low level of integration indicates that the implementation of the Education for Sustainable Development (ESD) program is not proceeding as intended (Čabrilo et al., 2015). Although Biology, a subject inherently linked to sustainable development, is part of the compulsory curriculum, its integration into the broader interdisciplinary framework remains suboptimal. Two circumstances must be emphasized. The first is that Biology is a compulsory subject in all classes of the general program of a gymnasium, but this is not the case with its other programs, and it is even less present in classes in high vocational schools. This further emphasizes the imperative cross-

curricular implementation, because students of high vocational schools in which they have Biology for one or two years for one or two hours a week remain deprived of this knowledge. In particular, it must be emphasized that students who graduate from high vocational schools often immediately continue to engage in their chosen profession, which means that special attention should be paid to shaping awareness of the importance of sustainable habits and ways of living and acting. Second, although the students were precisely asked that the survey refer to experiences from high school, it is possible that a part of the respondents (especially from vocational high schools) relied on knowledge of ESD in biology from elementary school. Especially if we are talking about students who only had it for one year with a low amount of classes, and then the impression left in their memory was from elementary school, where it is studied for 4 years as a compulsory subject. The highest familiarity is with the topic of environmental protection (about three-fifths), and the lowest for the green economy (about one-sixth), which a third of respondents are hearing about for the first time. This cannot be interpreted as satisfactory, especially if taking into consideration the fact that Montenegro was declared an ecological state in 1991, and the young generations are witnessing numerous examples of the devastation of the beautiful nature that they must know how to preserve for themselves and their descendants. This is precisely why the generations of respondents of this study should be aware that the future is in the green economy. It is unrealistic to expect a high level of awareness of this need if a third of respondents are encountering this term for the first time. Also, the data showed that self-education as a way to acquire knowledge was not used, so this points to the need to strengthen the ways to acquire knowledge through formal education. Measures that would improve this situation are further education of teachers on ESD, provision of teaching aids, adequate literature, creation of conditions for teacher motivation, but also a supervisory authority that will devise a way to monitor implementation. Education would be effective only if it included all teachers and members of the school administration, because only then would there be any justification for anyone not being familiar with the existence of cross-curricular ESD topics and its mandatory implementation.

Statistics significant differences between groups of high school students who have completed different types of high schools (students who have completed gymnasium and

those who have completed a four-year vocational high school) showed only For Biodiversity, Entrepreneurial learning, and Health education. Frequencies for category 3 (taught only in Biology classes) show higher frequencies for Biodiversity and Health Education among students who have completed gymnasium. This is expected given the higher number of classes in these subjects in gymnasium compared to vocational high schools. This underscores the increased need for greater representation of these subjects in vocational high schools. On the other hand, Entrepreneurial learning is more widely implemented as a cross-curricular theme in vocational high schools.

Considering the results from research question 7 ("How often did the teachers in high school from one or more subjects talk about the following topics?"), it is clear at first sight that in almost all the items offered, the highest values are precisely those that show that students never encountered them during their high school education. The range of these frequencies goes from about a fifth (Industry as a source of environmental pollution; Significance, composition, and sources of air pollution), to half (Biological hazards; "Green" traffic) and two-thirds of respondents (Ecoremediation). These results cannot be interpreted as satisfactory and emphasize the imperative need to improve teacher education, but also the reform of curricula and providing literature that supports such content. The respondents are young people for whom it is unacceptable not to be widely, at least informatively, familiar with all the offered topics, especially given the context of living in an ecological state like Montenegro. If these were the results of younger respondents, they could perhaps be interpreted more favorably, but as we are talking about future academic citizens or already prepared private individuals who are engaged in a profession from high school, then the results are not encouraging.

Interpreting the answers to question 5 ("Which teaching methods were the most frequent in the implementation of the content on sustainable development during high school ?") it follows that the most frequently used conventional teaching method, which implies a teacher who delivers a lesson while students passively listen (70% of the respondents answered often and very often). Interactive teaching methods and forms of teaching in which students have contact with nature and the possibility of developing awareness of sustainability

was rarely, very rarely, or never. This confirms the median and mode values of 1 and 2 for most items. On the other hand, the least frequently used teaching methods are lessons in the schoolyard and waste recycling (about 60% answered never and very rarely). Based on the results of the comparison of the groups (1-completed gymnasium, 2-completed four-year vocational high school), it is concluded that there is a statistically significant difference between the groups only in the items "teacher delivers a lesson, students listen" and "environmental sections". Both were more often used by students who finished gymnasium. If we consider the widely accepted conclusion among scholars that only active methods can lead to the desired outcomes of ESD (Howell, 2021; UNESCO, 2020), the results of this study are not encouraging. Teachers should not only inform students about the topic, but also change their attitudes to be proactive citizens (Cottafava et al., 2019; O'Flaherty & Liddy, 2018; Sinakou et al., 2019). Several factors could explain the current results, including unmotivated teachers, insufficient teaching materials, overcrowded classrooms, and a curriculum that leaves little time for additional activities. Concerns about student safety during environmental activities and the potential political implications of such initiatives may also discourage teachers from engaging in environmental issues. Additionally, the lack of technical teaching aids might hinder the use of innovative and engaging methods. However, it's important to recognize that the absence of technical aids is not the sole factor in shaping environmental awareness. Relying on passive learning methods limits opportunities for meaningful discussions, problem-solving debates, and hands-on experiences with nature, which are crucial for developing a deep understanding of sustainability. To build genuine environmental awareness, a shift towards more interactive and participatory teaching methods is necessary. The current implementation of the ESD curriculum, which has been in use since 2015, suggests that it is not being fully realized. Addressing these issues requires a significant overhaul of the teaching approach, including equipping teachers with the necessary materials and providing comprehensive training across all subjects. These steps are essential for creating an environment that supports effective ESD implementation, ultimately leading to a more robust and sustainable educational experience for students.

Analyzing the findings from question 3 ("How did different subjects from high school affect your knowledge about sustainable development?"), it is pointed out that the teaching of Biology (AS=4.83; median=5; mode=5 has the most influence on the acquisition of students' knowledge related to sustainable development. It is followed by Geography, Native language, and Psychology with modes of 6 (very important) and medians of 5 (important). At the opposite end of the spectrum, Philosophy and Physics have the least impact on students' knowledge of ESD. By comparing the results between the groups, it can be seen that Biology is more important for gymnasium students, while for those who have completed high vocational schools, Physical Education and Native language are more important. It is expected that Biology may have lower grades in importance among students who have completed a four-year vocational high school because it is incomparably less represented in them compared to gymnasium (especially its general program). This emphasizes the need for an increased number of classes in high vocational schools, especially from the aspect that after graduation, a high scope of students goes into their chosen profession, which is often related to the possibility of using chemicals, waste production, the use of fossil fuels, the possibility of using different energy sources... Furthermore, according to the student's grades, subjects whose compulsory teaching content is not close to sustainable development (Native language and Psychology) are ranked high. This confirms that the key to the success of the ESD program is only if it is implemented cross-curricularly. Certainly, this implies the reform of the mandatory subject contents, as well as the literature that will have methodological instructions that will be clear to every teacher. Question 3 is followed by question 4 (How satisfied are you with the adopted knowledge of ESD from various subjects in high school?), from which it is concluded that the respondents are most satisfied with the teaching of the subjects that they pointed out in the previous question as having the greatest impact on them when in question is knowledge about sustainable development.

Analyzing research question number 6 ("What is the opinion of first-year students about greater inclusion of ESD in teaching?"), the data show that for most items the medians are 2-4, while the modes for all items are 1 (except for the items "Interesting -Boring" and "Easy for teachers to implement-Difficult for teachers to implement") which all taken into

account leads to the conclusion that students of the first year of study expressed a rather positive attitude towards greater inclusion of ESD content in teaching. The only thing is that they did not express a clear opinion on whether these contents are interesting and whether they are easy for teachers to implement. Also, it is interesting that there is no statistically significant difference between the groups. This is commendable from the point of view of the positive attitude towards ESD shown by peers who have now entered university, but it is not expected given the fact that Gimnasium has always been synonymous with a school that provides general education and is attended by elementary school graduates who had the best grades in elementary school. It was to be expected that these students would have a noticeably more developed awareness of the importance of sustainable development and the need for expanding knowledge about it through formal education.

7. CONCLUSIONS

Based on the results of the research conducted among first-year high school students, first-year university students, and their teachers from elementary and secondary schools in Montenegro, the following findings can be summarized:

- trainings that the Institute for Education conducted almost ten years ago were not enough for all teachers in elementary and high schools in Montenegro to become familiar with the cross-curricular ESD program;
- the highest level of familiarity with the ESD program is among teachers in elementary school and the lowest among teachers in high vocational schools;
- half of the respondents familiar with ESD included it in teaching practice, which shows that teacher education is not a guarantee for the successful inclusion of the content presented at the trainings;
- the highest degree of implementation of the ESD program is among teachers in elementary school and the lowest among teachers in vocational high schools;
- teachers implement some topics that are in line with the objectives of ESD, but without their recognition as such, indicating a lack of understanding of the concept of sustainable development;
- in elementary and high schools, the goal of implementing the topics from the ESD program cross-curricularly, as the program recommends, has not been achieved;
- the greatest influence on students' acquisition of knowledge related to sustainable development and sustainable habits has the subjects with the highest number of classes per week, as well as subjects whose mandatory teaching content is closely related to the formation of a sustainable way of doing things;
- teachers have recognized the importance of ESD and have a clear attitude that students should acquire this knowledge and skills at an early age;
- teachers are not motivated to include ESD in teaching, finding several reasons for the lack of motivation;

- teachers consider it most desirable that sustainable development be taught by someone else as a separate subject;
- students who completed elementary school showed a neutral attitude toward ESD content;
- students who graduated from high school showed a more positive and clearer attitude about the importance of sustainable habits and ways of thinking and acting, compared to students who just graduated from elementary school;
- the students' opinions about ESD and the teaching methods used do not statistically differ between the groups of students who have completed gymnasium and those from high vocational schools;
- in elementary and high schools in Montenegro, when implementing ESD content, the most common is the conventional teaching method (the teacher delivers the lesson, and the students passively listen;
- teaching methods that connect students with nature are used very rarely or never.

7.1. Strategies and measures to improve the current situation: The path to a sustainable future

By triangulating the results of the studies, the conclusions emphasize that it is crucial to address the provision of preconditions for the smooth implementation of ESD that could lead to an improvement of the existing situation in this field. The proposed measures are below:

- it is necessary to implement a campaign that would reach every teacher in Montenegro and raise awareness of the existence of the cross-curricular ESD program;
- the need for new comprehensive training on the ESD program for all teachers in elementary and high schools in Montenegro is imperative, to ensure expertise in implementing the goals of the ESD program ("no teacher is left behind" strategy);
- form a team within the Institute for Education that would have the obligation to control the implementation of this program every year;

- form a team in each school that would control the implementation of cross-curricular topics;
- provide the necessary teaching aids for interactive teaching methods and extracurricular activities;
- to conduct quality training for teachers that would be supported by concrete examples of workshops that could in the best way raise students' awareness of the importance of a sustainable way of life for humanity;
- organize teacher trainings on the topic of using interactive teaching methods;
- make available appropriate literature for the implementation of ESD content for each subject, which would have detailed methodological instructions for implementation;
- to introduce cabinet teaching in all elementary and high schools;
- to improve the financial status of teachers to increase motivation for greater effort in teaching;
- the Ministry of Education should adopt the teaching practices of Scandinavian educational systems and integrate them into Montenegro's educational framework, tailored to the specific needs and possibilities of our system;
- form smaller classes (with an average of 20 students) to ensure a high level of educational support for each student, improve the interaction between teachers and students, and improve the quality of education as a whole;
- reduce mandatory teaching contents in the plans and programs of all subjects in which cross-curricular implementation is expected, and include contents on sustainable development that can be correlated;
- take care that the contents of the textbooks follow the principles of sustainable development, as well as that the curriculum of different subjects is in content and time correlation;
- make visits to competent institutions (museums, nature protection institutes, botanical gardens) mandatory for all students;
- to provide special financial resources for the transportation of students and tickets that would enable the realization of cooperation between institutions and schools;

- one-day trips to have an educational character that would include familiarisation with the beautiful nature of Montenegro, biodiversity, and the possibility of preserving and sustainable use of natural resources;
- to realize schools-in-nature in cooperation with experts in the fields of ecology, botany, and zoology, who would provide students with live contact with nature and the acquisition of knowledge that is not possible in the classroom in adequate locations;
- introduce teaching goals that must be realized with the cooperation of several teachers;
- make the cooperation of various professional assets mandatory when it comes to marking important dates for the environment and the community in general;

"Success in the coming years will belong to those who are guided by a sustainable vision for the future. This principle underscores the importance of preparing individuals to embrace such a vision" (Charles Clarke, as cited in Parkin et al., 2004). It is evident that immediate action is essential and that systemic solutions are needed, which go beyond the scope of isolated initiatives or actions by individual educators or schools. It calls for a concerted push toward comprehensive, coordinated strategies that integrate sustainability into future planning and education.

8. REFERENCES

Abd-Mutalib, H., Muhammad Jamil, C. Z., Mohamed, R., & Ismail, S.N.A. (2023). The determinants of environmental knowledge sharing behavior among accounting educators: a modified theory of planned behavior. *International Journal of Sustainability in Higher Education*. https://doi.org/ 10.1108/ijshe-02-2022-0053

Ejzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50* (2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Anderson, C., & Jacobson, S. (2018). Barriers to environmental education: How do teachers' perceptions in rural Ecuador fit into a global analysis? *Environmental Education Research, 24* (12), 1684-1696. https://doi.org/10.1080/13504622.2018.1477120

Anđić, D. (2010). *Škole u promicanju odgoja i obrazovanja za održivi razvoj*. [Schools in the promotion of education for sustainable development]. repository.svkri.uniri.hr. https://urn.nsk.hr/urn:nbn:hr:188:050661

Annan-Diab, F., & Molinari, C. (2017). Interdisciplinarity: Practical approach to advancing education for sustainability and for the Sustainable Development Goals. *The International Journal of Management Education, 15* (2), 73-83. https://doi.org/10.1016/j.ijme.2017.03.006

Anyolo, E., KärkkÄinen, S. & Keinonen, T. (2018). Implementing Education for Sustainable Development in Namibia: School Teachers' Perceptions and Teaching Practices. *Journal of Teacher Education for Sustainability, 20* (1), 64-81. DOI: https://doi.org/10.2478/jtes-2018-0004

Arbuthnott, K. D. (2009). Education for sustainable development beyond attitude change. *International Journal of Sustainability in Higher Education, 10* (2), 152–163. https://doi.org/10.1108/14676370910945954

Baumgartner, R. J. (2011). Critical perspectives of sustainable development research and practice. *Journal of Cleaner Production, 19* , 783–786. https://doi.org/10.1016/j.jclepro.2011.01.005

Berglund, T., & Gericke, N. (2015). Separated and integrated perspectives on environmental, economic, and social dimensions - an investigation of student views on sustainable development. *Environmental Education Research, 22* (8), 1115–1138. https://doi.org/10.1080/13504622.2015.1063589

Biesta, G., Priestley, M., & Robinson, S. (2015). The role of beliefs in teacher agency. *Teachers and teaching, 21* (6), 624-640. https://doi.org/10.1080/13540602.2015.1044325

Boeve-de Pauw, J., Gericke, N., Olsson, D., & Berglund, T. (2015). The effectiveness of education for sustainable development. *Sustainability, 7* (11), 15693-15717. https://doi.org/10.3390/su71115693

Bonnett, M. (2002). Education for Sustainability as a Frame of Mind. *Environmental Education Research, 8* (1), 9–20. https://doi.org/10.1080/13504620120109619

Boslaugh, S. E. (2016). *Silent Spring* | work by Carson. In Encyclopædia Britannica. https://www.britannica.com/topic/Silent-Spring

Broman, G. I., & Robèrt, K. H. (2017). A framework for strategic sustainable development. *Journal of Cleaner Production, 140* (1), 17–31. https://doi.org/10.1016/j.jclepro.2015.10.121

Brundtland, G. H. (1987). *Report of the World Commission on environment and development: Our common future*. United Nations. https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

Buil-Faregá, M., Casanovas, M., Ruiz-Munzón, N., & Filho, W. L. (2019). Flipped classroom as an active learning methodology in sustainable development curricula. *Sustainability, 11* (17), 4577. https://doi.org/10.3390/su11174577

Caković, D., Radusinović, M., Burzan, T., Nikolić, O. (2013). Zeleni paket junior-priručnik za nastavnike. [The junior green package-teacher's manual]. The Regional Environmental Center for Central and Eastern Europe. https://suzanamiljkovic.files.wordpress.com/2015/03/green_pack_junior_montenegro_mn_sep2013.pdf

Camioto, F. D. C., Mariano, EB, & Rebelatto, D. A. do N. (2017). Sustainability improvement opportunities in Brazilian sectors: Analysis of DEA slacks. *Brazilian Journal of Operations & Production Management, 14*(3), 363. https://doi.org/10.14488/bjopm.2017.v14.n3.a9

Carbach E. & Fischer D. (2017). Sustainability reporting at schools: Challenges and benefits. *Journal of Teacher Education for Sustainability, 9(*1), 69-81, https://doi.org/10.1515/jtes-2017-0005

CEED consulting. (2011). *Istraživanje o ponašanju, znanju i stavovima djece o klimatskim promjenama.* [Research on children's behavior and knowledge and attitudes about climate change]. UNDP & Unicef. https://www.unicef.org/montenegro/media/8161/file/MNE-media-MNEpublication407.pdf

CEED consulting. (2017a). *Istraživanje o upoznatosti djece u osnovnim i srednjim školama o klimatskim promjenama. Kvalitativni izvještaj-učenici i profesori.* [Research on the familiarity of children in elementary and high schools about climate changes. Qualitative report-students and professors].

CEED consulting. (2017b). *Istraživanje o upoznatosti djece u osnovnim i srednjim školama o klimatskim promjenama.* [Research on the familiarity of children in elementary and high schools about climate change].

Čabrilo, N., Grbović, S., Lalović, Z., Novović, R., Đorđević, J., Kaluđerović, S., Gligorović, B. & Radusinović, T. (2014a). *Obrazovanje za održivi razvoj -međupredmetna oblast u predmetnim programima - osnovna škola.* [Education for sustainable development - a cross-curricular area in the subject programs - elementary school].

Institute for Education. https://wapi.gov.me/download-preview/cd5a360f-c25b-42dc-a6df-8a5d04828512?version=1.0

Čabrilo, N., Grbović, S., Lalović, Z., Noviović, Z. Đorđević, J., Vušurović, M. (2014b). *Međupredmetne oblasti u predmetnim programima - opšta gimnazija.* [Cross-curricular areas in the subject programs - general program of gymnasium]. Institute for Education. https://www.gov.me/dokumenta/48eefc15-0724-466a-b4bd-1e117b0396ea

Čabrilo, N., Sudar S., & Vasiljević M. (2015). *Naša škola, metodološko uputstvo za implementaciju programa. Obrazovanje za održivi razvoj u okviru područja aktivnosti u predškolskom vaspitanju i obrazovanju (od 3 do 6 godina).* [Our school, methodological implementation instructions program. Education for sustainable development within areas activities in preschool education and education (from 3 to 6 years)]. Institute for Education&Regional Center for the environment. file:///C:/Users/Korisnik/Downloads/nasa-skola- metodolosko-uputstvo-za-implementation-programa-obrazovanje-za-odrzivi-razvoj-u-okviru-podrucja-aktivnosti-u-preschool - to education-and-education-from-3-to-6-years%20(1).pdf

Chen, S.-Y., & Liu, S.-Y. (2020). Developing students' action competence for a sustainable future: A review of educational research. *Sustainability, 12* (4), 1374. https://doi.org/10.3390/su12041374

Choi, J., Peters, M., & Mueller, R. O. (2010). Correlational analysis of ordinal data: From Pearson'sr to Bayesian polychoric correlation. *Asia Pacific education review, 11* (4), 459-466. https://doi.org/10.1007/s12564-010-9096-y

Commission of the European communities. (2001). *A sustainable Europe for a better world: A European Union strategy for sustainable development.* https://aei.pitt.edu/42719/1/COM_(2001)_264_final.pdf

Cooper, J. L., MacGregor, J., Smith, K. A., Robinson, P. (2000). Implementing small-group instruction: Insights from successful practitioners. *New Directions for Teaching and Learning 81*, 63–76. https://doi.org/10.1002/tl.8105

Cottafava, D., Cavaglià, G., & Corazza, L. (2019). Education of sustainable development goals through students' active engagement: A transformative learning experience. *Sustainability Accounting, Management and Policy Journal, 10*(3), 521-544. https://doi.org/10.1108/SAMPJ-05-2018-0152

Dancey, CP & Reidy, J. (2007). *Statistics without maths for psychology*. Pearson education.

Díaz-Iso, A., Eizaguirre, A., & García-Olalla, A. (2019). Extracurricular activities in higher education and the promotion of reflective learning for sustainability. *Sustainability, 11*(17), 4521. https://doi.org/10.3390/su11174521

Đurović, G., Knežević, J., Komar, O., Vulić, V., Galli, A. and Gligorić, B. (2016). *Nacionalna strategija održivog razvoja do 2030. (NSOR).* [National strategy sustainable development until 2030 (NSOR)]. Ministry of sustainable development and tourism. https://www.gov.me/dokumenta/67dc487e-097d-41d2-8fd5-7827a19a1f5a

Dmitrović, D. (nd). *PISA 2015. U Crnoj Gori, rezultati.* [PISA 2015 in Montenegro, results. Examination Center of Montenegro]. https://pisa.iccg.co.me/wp-content/uploads/2020/12/PISA-2015-rezultati.pdf

Efaw, J. (2005). No teacher left behind: How to teach with technology. *Educause Quarterly, 28* (4), 26-32. https://www.learntechlib.org/p/103679/.

Elliott, L. (2019). *Environmentalism - history of the environmental movement.* In Encyclopædia Britannica. https://www.britannica.com/topic/environmentalism/History-of-the-environmental-movement

Elston, D. M. (2021). Participation bias, self-selection bias, and response bias. *Journal of the American Academy of Dermatology*. http://dx.doi.org/10.1016/j.jaad.2021.06.025

Eurydice. (2023). *Key Features of the Education System*. https://eurydice.eacea.ec.europa.eu/national-education-systems/montenegro/overview

Eurydice. (2023a). *Crna Gora: Organizacija i struktura obrazovnog sistema.* [Montenegro: Organization and structure of educational system]. https://eurydice.eacea.ec.europa.eu/me/national- education-systems/montenegro/crna-goraorganizacija-i-struktura-obrazovnog-sistema

Eurydice. (2023b). *Crna Gora: Nastava i učenje u jedinstvenoj strukturi obrazovanja.* [Montenegro: Teaching and learning in a unique structure of education]. https://eurydice.eacea.ec.europa.eu/me/national-education-systems/montenegro/crna-goranastava-i-ucenje-u-jedinstvenoj-strukturi

Examination Center. (2023). *Rezultati međunarodnog testiranja učenika – PISA 2022 - PISA.* [Results international testing students - PISA 2022 - PISA]. Ministry education, science and innovation in Montenegro, https://pisa.iccg.co.me/rezultati-medunarodnog-testiranja-ucenika-pisa-2022/

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sagas.

Fielding, KS, McDonald, R., & Louis, WR (2008). Theory of planned behavior, identity, and intentions to engage in environmental activism. *Journal of Environmental Psychology, 28* (4), 318-326. https://doi.org/10.1016/j.jenvp.2008.03.003

Folke, C., Polasky, S., Rockström, J., Galaz, V., Westley, F., Lamont, M., Scheffer, M., Österblom, H., Carpenter, S. R., Chapin, F. S., Seto, K. C., Weber, E. U., Crona, B. I., Daily, G. C., Dasgupta, P., Gaffney, O., Gordon, L. J., Hoff, H., Levin, SA, & Lubchenco, J. (2021). Our future in the Anthropocene biosphere. *Ambio, 50* (4), 834–869. https://doi.org/10.1007/s13280-021-01544-8

Gandini, P., Marchionni, G., Studer, L., & Maja, R. (2019). Sustainable and aware mobility explained to children. *Sustainability, 11* (23), 6668. https://doi.org/10.3390/su11236668

Gardner, P. L. (1995). Measuring attitudes to science: Unidimensionality and internal consistency revisited. *Research in Science Education, 25* (3), 283–289. https://doi.org/10.1007/BF02357402

Gbededo, M. A., Liyanage, K., & Garza-Reyes, J. A. (2018). Towards a life cycle sustainability analysis: A systematic review of approaches to sustainable

manufacturing. *Journal of Cleaner Production, 184*, 1002–1015. https://doi.org/10.1016/j.jclepro.2018.02.310

Government of Montenegro. (2007). *Akcioni plan Integracija održivog razvoja u obrazovni sistem za period 2007-2009.* [Action plan of integration sustainable development in education system for the period 2007-2009]. https://www.gov.me/dokumenta/f080f5cb-f5e8-45fd-90f2-1b05195b8eb2

Government of Montenegro. (2013). *Komunikaciona strategija održivog razvoja Crne Gore 2011-2013.* [Communication strategy of sustainable development in Montenegro 2011-2013]. https://www.gov.me/dokumenta/f3c7ee6e-235f-4249-8ba5-4e73eeafa8bf

Government of Montenegro. (2016). *Eko škole u Crnoj Gori.* [Eco-schools in Montenegro]. https://www.gov.me/clanak/eko-skole-crnoj-gori

Government of Montenegro. (2022*). Održivi razvoj u Crnoj Gori.* [Sustainable development in Montenegro]. https://www.gov.me/clanak/odrzivi-razvoj-u-crnoj-gori

Government of Montenegro. (2024). *Srednje obrazovanje - Ministarstvo prosvjete, nauke i inovacija*. [High education - Ministry of education, science, and innovation]. https://www.gov.me/mps/resor-prosvjete/srednje-obrazovanje

Grant, R. (1997). A claim for the case method in the teaching of geography. *Journal of Geography in Higher Education, 21* (2), 171–185. https://doi.org/10.1080/03098269708725423

Grbović, S. (2010). Škola u obrazovanju za životnu sredinu i održivi razvoj. [School in education for environment and sustainable development]. *Vaspitanje i obrazovanje-časopis za pedagošku teoriju i praksu,* 13-30. https://zuns.me/sites/default/files/vaspitanje-i-obrazovanje/documents/Vaspitanje%20i%20obrazovanje%20br%201%20final.pdf

Guerra, A. (2017). Integration of sustainability in engineering education. *International Journal of Sustainability in Higher Education, 18* (3), 436–454. https://doi.org/10.1108/ijshe-02-2016-0022

Hattie, J. A. C. (2003). *Teachers make a difference, what is the research evidence?* Australian Council for Educational Research Conference, Melbourne. http://research.acer.edu.au/research_conference_2003/4/

Haubrich, H., Nebel, J., Schleicher, Y., Schrettenbrunner Volume, H., Reinfried, S., & Rempfler, A. (2007). *Geographical Views on Education for Sustainable Development.* International Geographical Union Commission on Geographical Education. https://www.geoeduc.ch/files_publi/proceedings_lucerne%20symposium_vol.42_2007.pdf

Heberlein, T. A. (2012). Navigating environmental attitudes. *Conservation Biology, 26* (4), 583–585. https://doi.org/10.1111/j.1523-1739.2012.01892.x

Hayk, P., & León, K. E. C. (2021). Barreras para la educación environmental en la educación secundaria. *Revista Conrado, 17* (S1), 153-158.

Holden, E., Linnerud, K., & Bannister, D. (2016). The imperatives of sustainable development. *Sustainable development, 25* (3), 213-226. https://doi.org/10.1002/sd.1647

Iliško, D. H., Ignatjeva, S., & MiËule, I. (2011). Teacher-carried research as a tool for teachers' professional growth. *Journal of Teacher Education for Sustainability, 13* (2), 87-103. https://doi.org/10.2478/v10099-011-0016-y.

Institute for Education. (2017). Analiza kurikuluma predškolskog, osnovnog i srednjeg obrazovanja-međupredmetna oblast Održivi gradovi i naselja. [Analysis of the preschool, elementary, and general high education curriculum - a cross-curricular area of Sustainable cities and sattlments].

Jannah, M., Halim, L., Meerah, T. S. M., & Fairuz, M. (2013). Impact of environmental education kit on students' environmental literacy. *Asian Social Science, 9* (12). https://doi.org/10.5539/ass.v9n12p1

Jensen, B. B., & Schnack, K. (2006). The action competence approach in environmental education. *Environmental Education Research, 12* (3-4), 471–486. https://doi.org/10.1080/13504620600943053

Karunanayaka, S. P., Naidu, S., Kugamoorthy, S., Dhanapala, T. D. T. L., Ariyaratne, A., Gonsalkorala, M., ... & Gnaneratnam, K. (2016). Towards open educational practices with reflective practice. Open University Research Sessions-2016. http://dx.doi.org/10.13140/RG.2.2.18600.37128

Kern, E., Carpenter, J. (1986). Effect of field activities on student learning. *Journal of Geological Education, 34* (3), 180-183. https://doi.org/10.5408/0022-1368-34.3.180

Kioupi, V., & Voulvoulis, N. (2019). Education for sustainable development: A systemic framework for connecting the SDGs to educational outcomes. *Sustainability, 11* (21), 6104. https://doi.org/10.3390/su11216104

Kirn, A. (2000). Sustainable development and environmentalist values. *Social ecology, 9* (3), 149-162. Retrieved from https://hrcak.srce.hr/141734

Kletečki, N., Hruševar, D. Mitić, B. & Šorgo, A. (2023). Plants are not boring, school botany is. *Education sciences, 13* (5). https://doi.org/10.3390/educsci13050489

Kopnina, H. (2020). Education for the future? Critical evaluation of education for sustainable development goals. *The Journal of Environmental Education, 51* (4), 280-291. https://doi.org/10.1080/00958964.2019.1710444

Lay, V. (2007). *Razvoj sposoban za budućnost. Prinosi promišljanju održivog razvoja Hrvatske.* [Future-ready development: Contributions to reflecting on sustainable development in Croatia]. Lay, V. (Ed.). Institut društvenih znanosti Ivo Pilar.

Lavie Alon, N. & Tal, T. (2015). Student self-reported learning outcomes of field trips: The pedagogical impact. *International Journal of Science Education, 37* (8), 1279-1298. https://doi.org/10.1080/09500693.2015.1034797

Leal Filho, W., Pallant, E., Enete, A., Richter, B., & Brandli, L. L. (2018). Planning and implementing sustainability in higher education institutions: An overview of the difficulties and potentials. *International Journal of Sustainable Development & World Ecology, 25* (8), 713–721. https://doi.org/10.1080/13504509.2018.1461707

Lovelock, J. E., & Margulis, L. (1974). Atmospheric homeostasis by and for the biosphere: the Gaia hypothesis. *Tellus A: Dynamic Meteorology and Oceanography, 26* (1-2), 2-10. https://doi.org/10.3402/tellusa.v26i1-2.9731

Mayer, M. (2002). *What can we do in school for ESD? Reflections and proposals from the ENSI International network.* https://www.ensi.org/global/downloads/Publications/35/DoInSchoolMayer1.pdf

Meadows, D. (2014). Envisioning a sustainable world. *Creating a Sustainable and Desirable Future*, 9–14. https://doi.org/10.1142/9789814546898_0002

Mensah, J., & Ricart Casadevall, S. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent Social Sciences, 5* (1). https://doi.org/10.1080/23311886.2019.1653531

Ministry of Education of Montenegro. (2022). *Školska statistika*. [School statistics]. https://www.skolskastatistika.edu.me/ss2022

Moore, M., O'Leary, P., Sinnott, D., & Russell O'Connor, J. (2019). Extending communities of practice: A partnership model for sustainable schools. *Environment, Development and Sustainability, 21* (4), 1745-1762. https://doi.org/10.1007/s10668-018-0101-7

Nerantzaki, T. (2016). Integrating English as a foreign language and digital storytelling in environmental education: An interdisciplinary approach in basic education. In book Prentzas, J. (Ed.), *Digital stories and their integration in early childhood and basic education: teaching scenarios and practical ideas* (pp. 115–128*)*. Nova Science Publishers.

Nikolić, A., Mrvaljević, I., Nikolić, O., Tomić V., Bulatović, V., Durković, N., Vujović, Šturm, D., Backović, S., Vučinić, I., & Šćekić, D. (2019). *Rezultati studije PISA 2015. i preporuke za obrazovne politike.* [Results of PISA study 2015 and recommendations for educational politics]. Unicef&Ministry of education. https://www.unicef.org/montenegro/media/8676/file/MNE-media MNEpublication500.pdf

Ntona, E., Georgopoulos, A., Malandrakis, G., & Ragkou, P. (2023). Teachers' barriers dealing with environmental education programs' implementation in Greek high schools. *Environmental Education Research,* 1-20. https://doi.org/10.1080/13504622.2023.2182257

OECD PISA (2006). Table 2.1c and Figure 2.11c, PISA 2006: Science competencies for tomorrow's world. http://dx.doi.org/10.1787/141844475532

OECD PISA. (2018). https://www.oecd.org/pisa/publications/PISA2018_CN_MNE.pdf

OECD PISA (2022). https://www.oecd.org/publication/pisa-2022-results/

O'Flaherty, J., & Liddy, M. (2018). The impact of development education and education for sustainable development interventions: A synthesis of the research. *Environmental education research, 24* (7), 1031-1049. https://doi.org/10.1080/13504622.2017.1392484

Olawumi, T. O., & Chan, D. W. M. (2018). A scientometric review of global research on sustainability and sustainable development. *Journal of Cleaner Production, 183*, 231–250. https://doi.org/10.1016/j.jclepro.2018.02.162

Parliament of Montenegro. (1991). *Deklaracija o ekološkoj državi*. [Declaration on ecological state]. https://epa.org.me/deklaracija-o-ekoloskoj-drzavi/

Parkin, S., Johnston, A., Buckland, H., Brookes, F. & White, E. (2004). *Guidance for higher education institutions learning and skills for sustainable development developing a sustainability literate society.* Forum for the future. https://classdat.appstate.edu/FAA/TEC/balllf/Files%20for%20Benton/Articles/learningandskills.pdf

Partanen-Hertell, M., Harju-Autti, P., & Kreft-Burman, K. (1999). *Raising environmental awareness in the Baltic sea area*. Helsinki: The Finnish Environment Institute.

Penuel, W. R., Fishman, B. J., Yamaguchi, R., & Gallagher, L. P. (2007). What makes professional development effective? Strategies that foster curriculum implementation. *American Educational Research Journal, 44* (4), 921-958. https://doi.org/10.3102/0002831207308221

Pirages, D. (1977). *The sustainable society: Implications for limited growth*. Praeger. https://books.google.me/books/about/The_Sustainable_Society.html?id=Yiq5AAAAIAAJ&redir_esc=y

Pogge, T. (2004). The first United Nations millennium development goal: A cause for celebration? *Journal of Human Development, 5* (3), 377-397. https://doi.org/10.1080/1464988042000277251

Posch, P. (1999). The ecologisation of schools and its implications for educational policy. *Cambridge Journal of Education, 29* (3), 341–348. https://doi.org/10.1080/0305764990290304

Priestley, M., Biesta, G., & Robinson, S. (2013). Teachers as agents of change: teacher agency and emerging models of curriculum. In: Priestley M, Biesta G. (ed.). *Reinventing the curriculum: new trends in curriculum policy and practice(* pp. 187-206), Bloomsbury Academic. https://www.researchgate.net/publication/263766319_Reinventing_the_Curriculum_New_Trends_in_Curriculum_Policy_and_Practice

Prokop, P., Prokop, M., & Tunnicliffe, S. D. (2007). Is biology boring? Student attitudes towards biology. *Journal of Biological Education, 42* (1), 36-39. http://dx.doi.org/10.1080/00219266.2007.9656105

Ramos, T. B., Caeiro, S., Pires, S. M., & Videira, N. (2018). How are new sustainable development approaches responding to societal challenges? *Sustainable Development, 26* (2), 117–121. https://doi.org/10.1002/sd.1730

Rauch, F. (2002). The potential of education for sustainable development for reform in schools. *Environmental Education Research, 8* (1), 43-51. https://doi.org/10.1080/13504620120109646

R Core Team (2021). R: A Language and environment for statistical computing. (Version 4.1) [Computer software]. Retrieved from https://cran.r-project.org. (R packages retrieved from MRAN snapshot 2022-01-01).

Rea, L. M., & Parker, R. A. (1992). *Designing and conducting survey research: A comprehensive guide.* Jossey-Bass Publishers.

Regional Center for Environment. (2009). *Zeleni paket-priručnik za nastavnike.* [Green package-teachers manual]. https://www.slideshare.net/prnsosmilanvukotic/zeleni-paket-prirucnik-za-nastavnike-55604726

Ruggerio, C. A. (2021). Sustainability and sustainable development: A review of principles and definitions. *Science of the Total Environment, 786* (1), 147481. https://doi.org/10.1016/j.scitotenv.2021.147481

Sachs, J. D. (2012). From millennium development goals to sustainable development goals. *The Lancet,* 379(9832), 2206-2211. https://doi.org/10.1016/S0140-6736(12)60685-0

Sachs, J. D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N., & Rockström, J. (2019). Six transformations to achieve the sustainable development goals. *Sustainability, 2* (9), 805-814. https://doi.org/10.1038/s41893-019-0352-9

Samuelsson, I. P., & Kaga, Y. (2008). *The contribution of early childhood education to a sustainable society.* UNESCO.

Sandri, O., Holdsworth, S., & Thomas, I. (2018). Assessing graduate sustainability capability post-degree completion. *International Journal of Sustainability in Higher Education, 19* (1), 2–14. https://doi.org/10.1108/ijshe-08-2016-0160

Shi L, Han L, Yang F, Gao L. (2019) The evolution of sustainable development theory: Types, goals, and research prospects. *Sustainability, 11* (24):7158. https://doi.org/10.3390/su11247158

Šorgo, A. & Kamenšek, A. (2012). Implementation of a curriculum for environmental education as education for sustainable development in Slovenian upper high schools. *Ener Educ Sci Tech-B, 4(*2), 1067-1076.

Silajdžić, I., Kurtagić, SM, & Vučijak, B. (2015). Green entrepreneurship in transition economies: A case study of Bosnia and Herzegovina. *Journal of Cleaner Production, 88*, 376-384. http://dx.doi.org/10.1016/j.jclepro.2014.07.004

Sinakou, E., Donche, V., Boeve-de Pauw, J., & Van Petegem, P. (2019). Designing powerful learning environments in education for sustainable development: A conceptual framework. *Sustainability, 11* (21), 5994. https://doi.org/10.3390/su11215994

Sivapalan, S. (2016). Engineering education for sustainable development in Malaysia: Student stakeholders' perspectives on the integration of holistic sustainability competencies within undergraduate engineering programmes. In W. Leal Filho & L. Brandli (Eds.), *Engaging Stakeholders in Education for Sustainable Development at University Level* (pp. 263–285). Springer International Publishing. https://link.springer.com/book/10.1007/978-3-319-26734-0

Statistical Office of Montenegro MONSTAT. (2022). https://monstat.org/uploads/files/publikacije/Zene%20i%20muskarci%20u%20CG%20web%2026.12%20FIN.pdf

Statistical Office of Montenegro MONSTAT. (2023). https://www.monstat.org/cg/page.php?id=195&pageid=76

Steffen, W., Greenewald, J., Crutzen, P., & McNeill, J. (2011). The anthropocene: Conceptual and historical perspectives. *Philosophical Transactions of the Royal Society A: Mathematical. Physical and Engineering Sciences, 369* (1938), 842–867. https://doi.org/10.1098/rsta.2010.0327

Sterling, S. (2001). *Sustainable education: Re-visioning learning and change*. Schumacher Briefings.

Svanström, M., Sjöblom, J., Segalàs, J., & Fröling, M. (2018). Improving engineering education for sustainable development using concept maps and multivariate data analysis. *Journal of Cleaner Production, 198*, 530–540. https://www.sciencedirect.com/science/article/pii/S0959652618320377

Tal, T., & Morag, O. (2017). Reflective practice is a means of preparing to teach outdoors in an ecological garden. *Journal of Science Teacher Education, 20* (3), 245–262. https://doi.org/10.1007/s10972-009-9131-1

The Belgrade Charter: A framework for environmental education (1975). https://www.eusteps.eu/wp-content/uploads/2020/12/Belgrade-Charter.pdf

The Global Goals. (2023). *Goal 4: Quality education. The global goals*. https://www.globalgoals.org/goals/4-quality-education/

The jamovi project (2022). jamovi. (Version 2.3) [Computer Software]. Retrieved from: https://www.jamovi.org

The world's goals to save humanity are hugely ambitious-but they are still the best option. (2023). *Nature, 621* (7978), 227–229. https://doi.org/10.1038/d41586-023-02844-7

Tranter, J. (2004). Biology: dull, lifeless and boring? *Journal of Biological Education, 38* (3), 104–105. https://doi.org/10.1080/00219266.2004.9655914

United Nations Environment Program UNEP (1972). *United Nations conference on the environment. Stockholm declaration. UNEP.* https://wedocs.unep.org/bitstream/handle/20.500.11822/29567/ELGP1StockD.pdf

United Nations. (1992). *United Nations conference on environment and development (UNCED).* https://www.un.org/en/conferences/environment/rio1992

United Nations. (2002). *World summit on sustainable development, Johannesburg 2002.* United Nations. https://www.un.org/en/conferences/environment/johannesburg2002

United Nations. (2005). *UNECE strategy for education for sustainable development, economic commission for Europe, ac.13/2005/3.* United Nations. https://unece.org/DAM/env/documents/2005/cep/ac.13/cep.ac.13.2005.3.rev.1.e.pdf

United Nations. (2012). *Rio+20 - United Nations conference on sustainable development.* https://sustainabledevelopment.un.org/rio20

United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development.* https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

United Nations (UN). (2021). *The-sustainable-development-goals-report-2021.* https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf

United Nations. (2023). *Global sustainable development report (GSDR) 2023.* https://sdgs.un.org/gsdr/gsdr2023#:~:text=%22Times%20of%20Crisis%2C%20Times%20of

United Nations. (2023a). *Political declaration.* https://www.un.org/en/conferences/SDGSummit2023/political-declaration

United Nations. (2023b). *SDG summit 2023.* United Nations. https://www.un.org/en/conferences/SDGSummit2023

UNECE. (2014). *National implementation report, as submitted by: Montenegro* . https://unece.org/DAM/env/esd/10thMeetSC/Documents/Montenegro.pdf

UNECE. (2016). *Ten years of the UNECE strategy for education for sustainable development evaluation report on the implementation of the UNECE strategy for education for sustainable development from 2005 to 2015.* https://unece.org/DAM/env/esd/ESD_Publications/10_years_UNECE_Strategy_for_ESD.pdf

UNESCO (2005). *United Nations decade of education for sustainable development (2005-2014): International implementation scheme, ED/DESD/2005/PI/01.* https://unesdoc.unesco.org/ark:/48223/pf0000148654

UNESCO. (2009). *Main outcomes of the workshop: Education for water sustainability: Where decades meet, workshop 1 of the UNESCO world conference on education for sustainable development, Bonn, Germany, 31 March-2 April 2009.* https://unesdoc.unesco.org/search/N-EXPLORE-e42b8382-c642-486e-b410-45a68478eded

UNESCO. (2018). Issues and trends in education for sustainable development. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000261954

UNESCO. (2020). *Education for sustainable development: A roadmap.* UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000374802

UNESCO. (2021a). *Berlin declaration on education for sustainable development preamble.* https://en.unesco.org/sites/default/files/esdfor2030-berlin-declaration-en.pdf

UNESCO. (2021b). *United Nations decade of education for sustainable development (2005-2014): International implementation scheme.* https://unesdoc.UNESCO.org/ark:/48223/pf0000148654

UNESCO. (2022). *The European declaration on global education to 2050. The Dublin declaration. A strategy framework for improving and increasing global education in Europe to 2050 final pre-congress.* https://www.unesco.at/fileadmin/user_upload/final_GE2050-declaration.pdf

US EPA (2019). *EPA history: Earth day. The first Earth day in April 1970.* https://www.epa.gov/history/epa-history-earth-day

Vangrieken, K., Meredith, C., Packer, T., & Kyndt, E. (2017). Teacher communities as a context for professional development: A systematic review. *Teaching and teacher education, 61*, 47-59. https://doi.org/10.1016/j.tate.2016.10.001

Visser, M., Kovač-Cerović T. (2022). *Sector analysis of education 2015-2020.* Unicef. Ministry of education. ttps://www.unicef.org/montenegro/media/22586/file/ESA%20-%20CG%20verzija.pdf

Vladimirova, K., & Le Blanc, D. (2016). Exploring links between education and sustainable development goals through the lens of UN flagship reports. *Sustainable Development, 24* (4), 254-271. https://doi.org/10.1002/sd.1626

Waltner, E.M., Rieß, W., & Mischo, C. (2019). Development and validation of an instrument for measuring student sustainability competencies. *Sustainability, 11* (6), 1717. https://doi.org/10.3390/su11061717

Watkins, M. W. (2018). Exploratory factor analysis: A guide to best practice. *Journal of black psychology, 44* (3), 219-246.

Weitz, N., Carlsen, H., Thérèse Bennich, Nilsson, M., & Persson, Å. (2023). Returning to core principles to advance the 2030 Agenda. *Nature Sustainability, 6* (10), 1145–1148. http://dx.doi.org/10.1038/s41893-023-01212-7

World Economic Forum. (2019). *Global survey shows 74% are aware of the sustainable development goals.* https://www.weforum.org/press/2019/09/global-survey-shows-74-are-aware-of-the-sustainable-development-goals/

9. APPENDICES

Appendix 1.

Questionnaire for target group 1: Experiences and attitudes of elementary and high school teachers in Montenegro on education for sustainable development

Dear Professor,

This questionnaire is part of the research for my doctoral dissertation. The questions refer to your experiences and attitudes about education for sustainable development.

The research is completely anonymous, and the data obtained will be used exclusively for scientific purposes. Data will be analyzed at the group level, not individually. Please read each question carefully and answer honestly.

It will take you 5-10 minutes.

Thank you in advance for your time and cooperation.

$Q1_1$- How familiar are you with the cross-curricular program Education for sustainable development?

$Q1_1$ I'm not familiar and I'm not interested in finding out

$Q1_1$ I'm not familiar, but I'm interested in finding out

$Q1_1$ I'm familiar with it, but I don't know what it means

Q1$_1$ I am partially familiar

Q1$_1$ I am familiar with and know what it entails

Q2$_1$- How do you use the cross-curricular program-Education for sustainable development in your teaching?

Q2$_1$ I am not familiar with the program and I do not use it in class.

Q2$_1$ I am familiar with the program, but I do not use it in class

Q2$_1$ I am familiar with the program and I use it in class

Q3$_1$-How are you familiar with the methodological instructions for the implementation of the Education for sustainable development program?

Q3a$_1$ I am not familiar with, and I am not interested in finding out

Q3b$_1$ I'm not familiar with, but I'm interested in finding out

Q3c$_1$ I'm familiar with it, but I don't know what it means

Q3d$_1$ I am partially familiar

Q3e$_1$ I am familiar with it and know what it entails

Q5ı-How often do you include content on sustainable development in the teaching of your subject?

	1 - Never	2 - Very rare	3 - Rarely	4 - Sometimes	5 - Often	6 - Very often
Q5aı Climate change	○	○	○	○	○	○
Q5bı Green economy	○	○	○	○	○	○
Q5cı Environmental protection	○	○	○	○	○	○
Q5dı Sustainable cities and settlements	○	○	○	○	○	○
Q5eı Biodiversity	○	○	○	○	○	○
Q5fı Health education and upbringing	○	○	○	○	○	○
Q5gı Human rights education	○	○	○	○	○	○
Q5hı Entrepreneurial learning	○	○	○	○	○	○

Q6ı-A greater inclusion of sustainable development content in the teaching of my subject would be:

The following are tables with pairs of opposite statements and a scale of numbers from 1-7 between them. Show with a number which extreme your opinion is closer to.

	1	2	3	4	5	6	7	
Q6aı Useful	○	○	○	○	○	○	○	Useless
Q6bı Necessary	○	○	○	○	○	○	○	Needlessly

Q6c₁ Interesting	○ ○ ○ ○ ○ ○ ○	Boring
Q 6d₁ Easy to implement	○ ○ ○ ○ ○ ○ ○	Difficult to implement
Q6e₁ Easy for students to master	○ ○ ○ ○ ○ ○ ○	Difficult for students to master
Q6f₁ Important for the whole of society	○ ○ ○ ○ ○ ○ ○	Unimportant to society
Q6g₁ Important for students	○ ○ ○ ○ ○ ○ ○	Unimportant to students
Q6h₁ Important for further education of students	○ ○ ○ ○ ○ ○ ○	Irrelevant for the further education of the student
Q6i₁ Important for future generations	○ ○ ○ ○ ○ ○ ○	Irrelevant for future generations
Q6j₁ Important for a healthy environment	○ ○ ○ ○ ○ ○ ○	Unimportant for a healthy environment
Q6k₁ Important for human health	○ ○ ○ ○ ○ ○ ○	Unimportant for human health
Q6l₁ Important for survival on Earth	○ ○ ○ ○ ○ ○ ○	Irrelevant to survival on Earth

Q7₁-Reasons that influence the inclusion of content on sustainable development in the subject I teach:

The following are tables with pairs of opposite statements and a scale of numbers from 1 (Strongly disagree) to 7 (Strongly agree) between them. Show with a number which extreme your opinion is closer to.

	1 - I completely disagree	2	3	4	5	6	7 - I completely agree
Q7a₁ Education for sustainable development is irrelevant. That's why you shouldn't pay attention to him.	○	○	○	○	○	○	○
Q7b₁ The main objectives of my subject are too demanding, so I don't have time for additional topics.	○	○	○	○	○	○	○

Q7c$_1$ I am not educated enough about sustainable development.	○	○	○	○	○	○	○
Q7d$_1$ Teachers are not adequately paid to make efforts around education for sustainable development.	○	○	○	○	○	○	○
Q 7e$_1$ I am not motivated enough to put effort into extracurricular activities.	○	○	○	○	○	○	○
Q7f$_1$ It is more difficult to prepare and organize a lesson that includes sustainable development.	○	○	○	○	○	○	○
Q7g$_1$ The school is not equipped with teaching aids that are necessary for topics on sustainable development.	○	○	○	○	○	○	○
Q7h$_1$ Education for sustainable development is not equally represented in all subjects. I will not try harder than others.	○	○	○	○	○	○	○
Q7i$_1$ No one controls the implementation of education for sustainable development.	○	○	○	○	○	○	○
Q7j$_1$ Students are not interested in learning about sustainable development.	○	○	○	○	○	○	○
Q7k$_1$ No one appreciates additional activities in class, so you should focus to the basic subject objectives.	○	○	○	○	○	○	○
Q7l$_1$ Contents about sustainable development are often outside the schoolbook, so students and their parents are against it.	○	○	○	○	○	○	○
Q7m$_1$ Students should only learn about sustainable development at university.	○	○	○	○	○	○	○

Q7n$_1$ I have no methodological recommendations for the implementation of education for sustainable development.	○	○	○	○	○	○	○
Q7o$_1$ I need quality training to be ready to incorporate education for sustainable development into teaching practice.	○	○	○	○	○	○	○
Q 7p$_1$ It is necessary to introduce a compulsory subject that would deal only with sustainable development.	○	○	○	○	○	○	○
Q7r$_1$ I do not have adequate literature.	○	○	○	○	○	○	○

Q8$_1$-Mark the box that corresponds to the frequency of using the specified teaching method in your teaching practice:

	1 - Never	2 - Very rare	3 - Rarely	4 - Sometimes	5 - Often	6 - Very often
Q8a$_1$ I deliver the lesson, the students listen	○	○	○	○	○	○
Q8b$_1$ I lead a debate and dialogue with students	○	○	○	○	○	○
Q8c$_1$ I teach using group work	○	○	○	○	○	○
Q8d$_1$ I teach in the schoolyard	○	○	○	○	○	○
Q8e$_1$ I work on projects important	○	○	○	○	○	○

to the school and the community						
Q 8f$_1$ I organize afforestation actions	○	○	○	○	○	○
Q8g$_1$ I use presentations and workshops	○	○	○	○	○	○
Q8h$_1$ I take students on short trips to become familiar with nature	○	○	○	○	○	○
Q8i$_1$ I show ways of separating and recycling waste	○	○	○	○	○	○
Q8j$_1$ I teach classes that include teachers from different subjects	○	○	○	○	○	○
Q8k$_1$ I transfer knowledge to students through quizzes and educational games	○	○	○	○	○	○

Q 8lı I mark important dates for the environment and the community	○	○	○	○	○	○
Q8mı I am organizing activities related to environmental problems in the city	○	○	○	○	○	○
Q8nı I organize environmental sections	○	○	○	○	○	○
Q8oı I organize visits to competent institutions	○	○	○	○	○	○

Q9ı **- I am a professor:**

Q9aı in elementary school

Q9bı gymnasium

Q9cı other high schools

Appendix 2.

Questionnaire for target group 2: Experiences and attitudes of first grade high school students on education for sustainable development

Dear student,

In front of you is a questionnaire that refers to the knowledge you acquired in elementary school.

I am asking you to answer the questions honestly and thus help me to get information that is important for my doctoral dissertation. You are helping me voluntarily and you can stop filling out the questionnarie at any time.

The choice of answer cannot affect you in any way because the survey is anonymous.

It will take you about 5 minutes to fill out the questionnaire.

Thank you for your time and cooperation!

Q1$_2$-How did you find out about the mentioned topics related to sustainable development?

I hear about this topic for the first time in this questionnaire	This topic was only mentioned in school, but not explained	This topic is explained in detail only in biology classes	This topic is explained in detail in several subjects	I only heard about this topic in the media	I learned about this topic independently from the available literature

Q1a$_2$ Climate change	○	○	○	○	○	○
Q1 b$_2$ Green economy	○	○	○	○	○	○
Q1c$_2$ Environmental protection	○	○	○	○	○	○
Q1d$_2$ Sustainable cities and settlements	○	○	○	○	○	○
Q1e$_2$ Biodiversity	○	○	○	○	○	○
Q1f$_2$ Health education	○	○	○	○	○	○
Q1g$_2$ Human rights education	○	○	○	○	○	○
Q1h$_2$ Entrepreneurial learning	○	○	○	○	○	○

Q2$_2$ - Express the importance of the mentioned subjects from elementary school regarding to your knowledge about the importance of coordinated ecological, economic, and social development on Earth.

Check the appropriate box.

	Completely unimportant	Quite unimportant	Little important	Moderately important	Important	Very important
Q2a$_2$ Biology	○	○	○	○	○	○
Q2b$_2$ Chemistry	○	○	○	○	○	○
Q2 c$_2$ Physics	○	○	○	○	○	○
Q2d$_2$ Geography	○	○	○	○	○	○
Q2e$_2$ Nature	○	○	○	○	○	○
Q2f$_2$ Nature and society	○	○	○	○	○	○
Q2g$_2$ Native language	○	○	○	○	○	○
Q2h$_2$ Art culture	○	○	○	○	○	○
Q2i$_2$ Physical education	○	○	○	○	○	○
Q2j$_2$ Mathematics	○	○	○	○	○	○
Q2k$_2$ History	○	○	○	○	○	○

Q3$_2$ - Express the level of satisfaction with the acquired knowledge from the mentioned subjects, which concern harmonized ecological, economic, and social development.

	Completely unsatisfied	Quite dissatisfied	A little satisfied	Moderately satisfied	Satisfied	Very satisfied	Completely Satisfied
Q3a$_2$ Biology	○	○	○	○	○	○	○
Q3b$_2$ Chemistry	○	○	○	○	○	○	○
Q3 c$_2$ Physics	○	○	○	○	○	○	○
Q3d$_2$ Geography	○	○	○	○	○	○	○
Q3e$_2$ Nature	○	○	○	○	○	○	○
Q3f$_2$ Nature and society	○	○	○	○	○	○	○
Q3g$_2$ Native language	○	○	○	○	○	○	○
Q3h$_2$ Art culture	○	○	○	○	○	○	○
Q3i$_2$ Physical education	○	○	○	○	○	○	○
Q3j$_2$ Mathematics	○	○	○	○	○	○	○
Q3k$_2$ History	○	○	○	○	○	○	○

Q4$_2$ - The table shows different teaching methods used in the implementation of the content on sustainable development.

Mark the box that corresponds to the frequency of their use in lessons during your elementary school education.

	Never	Very rarely	Rarely	Sometimes	Often	Very often
Q4a$_2$ Teacher delivers a lesson, and students listen	○	○	○	○	○	○
Q4 b$_2$ Debate and dialogue between students and teachers	○	○	○	○	○	○
Q4c$_2$ Group work	○	○	○	○	○	○
Q4d$_2$ Conducting lessons in the schoolyard	○	○	○	○	○	○
Q4e$_2$ Work on projects important to the school and community	○	○	○	○	○	○
Q4f$_2$ Organizing afforestation actions	○	○	○	○	○	○
Q4g$_2$ Presentations and workshops	○	○	○	○	○	○

Q4h₂ Excursions to become familiar with nature	○	○	○	○	○	○
Q4i₂ Waste recycling	○	○	○	○	○	○
Q4 j₂ Work involving teachers from different subjects	○	○	○	○	○	○
Q4k₂ Learning through quizzes and educational games	○	○	○	○	○	○
Q4l₂ Marking important dates for the environment and the community	○	○	○	○	○	○
Q4m₂ Organizing activities related to environmental problems in the city	○	○	○	○	○	○
Qn4₂ Ecological sections	○	○	○	○	○	○

Q4o2 Visits to competent institutions	○	○	○	○	○	○

Q5 2 - The table contains pairs of opposite statements and a scale of numbers from 1-7 between them. Show with a number which extreme your opinion is closer to.

If more content related to sustainable development were to be included in the teaching, it would be:

	1 2 3 4 5 6 7	
Q5a2 Useful	○ ○ ○ ○ ○ ○ ○	Useless
Q5b2 Necessary	○ ○ ○ ○ ○ ○ ○	Needlessly
Q5c2 Interesting	○ ○ ○ ○ ○ ○ ○	Boring
Q5d2 Easy for teachers to implement	○ ○ ○ ○ ○ ○ ○	Difficult for teachers to realize
Q5e2 Easy for students to master	○ ○ ○ ○ ○ ○ ○	Difficult for students to master
Q5f2 Important for the whole society	○ ○ ○ ○ ○ ○ ○	Unimportant to society
Q5g2 Important for students	○ ○ ○ ○ ○ ○ ○	Unimportant to students
Q5h2 Important for my further education	○ ○ ○ ○ ○ ○ ○	Irrelevant to my further education
Q5i2 Important for future generations	○ ○ ○ ○ ○ ○ ○	Irrelevant for future generations
Q5j2 Important for a healthy environment	○ ○ ○ ○ ○ ○ ○	Unimportant for a healthy environment
Q5k2 Important for human health	○ ○ ○ ○ ○ ○ ○	Unimportant for human health
Q5l2 Significant for survival on Earth	○ ○ ○ ○ ○ ○ ○	Irrelevant to survival on Earth

Q6₂ - How often did elementary school teachers in one or more subjects talk about the following topics?

	Never	Very rare	Rarely	Sometimes	Often	Very often
Q6 aa₂ Sustainable development	○	○	○	○	○	○
Q6ab₂ Global warming, greenhouse effect	○	○	○	○	○	○
Q6ac₂ Consequences of climate change	○	○	○	○	○	○
Q6ad₂ "Green Economy"	○	○	○	○	○	○
Q6ae₂ Sustainable agriculture	○	○	○	○	○	○
Q6af₂ The importance of forests and their sustainable management	○	○	○	○	○	○
Q6ag₂ The problem with waste and the	○	○	○	○	○	○

importance of recycling						
Q6ah2 Types and importance of renewable energy sources	○	○	○	○	○	○
Q6 ai2 Advantages and disadvantages of fossil fuels	○	○	○	○	○	○
Q6aj2 Ecological problems in Montenegro	○	○	○	○	○	○
Q6ak2 How can each of us help preserve the environment?	○	○	○	○	○	○
Q6al2 Sources of noise and its impact on human health	○	○	○	○	○	○
Q6am2 Importance, composition and sources of air pollution	○	○	○	○	○	○

Q6an2 Acid rain and its impact	○	○	○	○	○	○
Q6ao2 Importance of rational use of natural resources	○	○	○	○	○	○
Q6 ap2 Ways to reduce pollution originating from traffic	○	○	○	○	○	○
Q6aq2 Causes of biodiversity loss	○	○	○	○	○	○
Q6ar2 Importance of land, its protection	○	○	○	○	○	○
Q6as2 Ecological significance of mountain areas	○	○	○	○	○	○
Q6at2 Consequences of destruction of rivers, lakes, seas, and coasts	○	○	○	○	○	○
Q6au2 Flora and fauna of National Parks, internationally	○	○	○	○	○	○

protected habitats and protected species in Montenegro						
Q6 av2 Consequences of improper nutrition and poor physical activity	○	○	○	○	○	○
Q6aw2 The importance of a healthy environment for human health	○	○	○	○	○	○
Q6ax2 Rights and obligations in the community	○	○	○	○	○	○
Q6ay2 Difference between sex and gender	○	○	○	○	○	○
Q6az2 Respect for diversity	○	○	○	○	○	○
Q6ba2 European Union, advantages and disadvantages of	○	○	○	○	○	○

Montenegro
joining the
European Union

Appendix 3.

Questionnaire for target group 3: Experiences and attitudes of first-year students on education for sustainable development

Dear student,

In front of you is a questionnaire related to the knowledge and attitudes you acquired in high school.

I am asking you to answer the questions honestly and thus help me to get the data that is important for my doctoral dissertation.

The choice of answer cannot influence you in any way because the survey is anonymous. You are helping me voluntarily and you can stop filling out the questionnaire at any time.

It will take you about 5 minutes to fill out the questionnaire.

Thank you for your time and cooperation!

Q1$_3$ - Tick the appropriate statement:

Q1a$_3$ I am a FIRST-YEAR student

Q1b$_3$ I am a student, but NOT in my first year of study

Q2 $_3$ - How did you find out about the mentioned topics related to sustainable development?

I hear about this topic for the first time	This topic was only mentioned in school, but	This topic is explained in detail only in	This topic is explained in detail in several	I only heard about this topic in the	I learned from the available literature

	in this questionnaire	not explained	biology classes	subjects	media	
Q2a3 Climate change	○	○	○	○	○	○
Q2b3 Green economy	○	○	○	○	○	○
Q2c3 Environmental protection	○	○	○	○	○	○
Q2d3 Sustainable cities and settlements	○	○	○	○	○	○
Q2e3 Biodiversity	○	○	○	○	○	○
Q2h3 Health education	○	○	○	○	○	○
Q23 Human rights education	○	○	○	○	○	○
Q23 Entrepreneurial learning	○	○	○	○	○	○

Q33 - Express the importance of the mentioned subjects from high school when it comes to your knowledge about the importance of coordinated ecological, economic, and social development on Earth.

Check the appropriate box.

	Completely unimportant	Pretty unimportant	Little important	Moderately important	Important	Very important
Q3a$_3$ Chemistry	○	○	○	○	○	○
Q3b$_3$ Biology	○	○	○	○	○	○
Q3c$_3$ Physics	○	○	○	○	○	○
Q3d$_3$ Geography	○	○	○	○	○	○
Q3e$_3$ Sociology	○	○	○	○	○	○
Q3f$_3$ Psychology	○	○	○	○	○	○
Q3g$_3$ Philosophy	○	○	○	○	○	○
Q3h$_3$ History	○	○	○	○	○	○
Q3i$_3$ Physical education	○	○	○	○	○	○
Q3j$_3$ Mathematics	○	○	○	○	○	○
Q3k$_3$ Native language	○	○	○	○	○	○

Q4 $_3$ - Express the level of satisfaction with the acquired knowledge from the mentioned subjects, which concern harmonized ecological, economic, and social development.

Completely dissatisfied	Quite dissatisfied	A little pleased	Moderately satisfied	Satisfied	Very satisfied	Completely satisfied

Q4a$_3$ Chemistry	○	○	○	○	○	○	○
Q4b$_3$ Biology	○	○	○	○	○	○	○
Q4c$_3$ Physics	○	○	○	○	○	○	○
Q4d$_3$ Geography	○	○	○	○	○	○	○
Q4e$_3$ Sociology	○	○	○	○	○	○	○
Q4f$_3$ Psychology	○	○	○	○	○	○	○
Q4g$_3$ Philosophy	○	○	○	○	○	○	○
Q4h$_3$ Physical education	○	○	○	○	○	○	○
Q4i$_3$ History	○	○	○	○	○	○	○
Q4j$_3$ Mathematics	○	○	○	○	○	○	○
Q4k$_3$ Native language	○	○	○	○	○	○	○

Q5$_3$ **- The table contains different teaching methods used in the implementation of teaching on sustainable development. Mark the box that corresponds to the frequency of their use in class during your high school education.**

	Never	Very rare	Rarely	Sometimes	Often	Very often
Q5a$_3$ Teacher delivers a lesson, and students listen	○	○	○	○	○	○
Q5b$_3$ Debate and dialogue between students and teachers	○	○	○	○	○	○

Q5c$_3$ Group work	○	○	○	○	○	○
Q5d$_3$ Conducting lessons in the schoolyard	○	○	○	○	○	○
Q5e$_3$ Work on projects important to the school and community	○	○	○	○	○	○
Q5f$_3$ Organizing afforestation actions	○	○	○	○	○	○
Q5g$_3$ Presentations and workshops	○	○	○	○	○	○
Q5h$_3$ Excursions to became familiar with nature	○	○	○	○	○	○
Q5i$_3$ Waste recycling	○	○	○	○	○	○
Q5j$_3$ Work involving teachers from different subjects	○	○	○	○	○	○
Q5k$_3$ Learning through quizzes and educational games	○	○	○	○	○	○
Q5l$_3$ Marking important dates for the environment and the community	○	○	○	○	○	○
Q5m$_3$ Organizing activities related to environmental problems in the city	○	○	○	○	○	○
Q5n$_3$ Environmental sections	○	○	○	○	○	○
Q5o$_3$ Visits to competent institutions	○	○	○	○	○	○

Q6 $_3$ - The table contains pairs of opposite statements and a scale of numbers from 1-7 between them. Show with a number which extreme your opinion is closer to. If more content related to sustainable development were to be included in the teaching, it would be:

	1	2	3	4	5	6	7	
Q6a₃ Useful	○	○	○	○	○	○	○	Useless
Q6b₃ Necessary	○	○	○	○	○	○	○	Needlessly
Q6c₃ Interesting	○	○	○	○	○	○	○	Boring
Q6d₃ Easy for teachers to implement	○	○	○	○	○	○	○	Difficult for teachers to realize
Q6e₃ Easy for students to learn	○	○	○	○	○	○	○	Difficult for students to learn
Q6f₃ Important for the whole society	○	○	○	○	○	○	○	Unimportant to society
Q6g₃ Important for students	○	○	○	○	○	○	○	Unimportant to students
Q6h₃ Important for my further education	○	○	○	○	○	○	○	Irrelevant to my further education

Q6i3 Important for future generations	○	○	○	○	○	○	○	Irrelevant for future generations
Q6 j3 Important for a healthy environment	○	○	○	○	○	○	○	Unimportant for a healthy environment
Q6k3 Important for human health	○	○	○	○	○	○	○	Unimportant for human health
Q6l3 Important for survival on Earth	○	○	○	○	○	○	○	Irrelevant to survival on Earth

Q73 - How often did high school teachers in one or more subjects talk about the following topics?

	Never	Very rarely	Rarely	Sometimes	Often	Very often
Q7aa3 Principles of sustainable development	○	○	○	○	○	○
Q7ab3 Mechanism of climate change	○	○	○	○	○	○

Q7 ac3 Impact of demographic explosion and pollution on nutrition and agriculture	○	○	○	○	○	○
Q7ad3 Genetically modified organisms	○	○	○	○	○	○
Q7ae3 Organic and integrated agriculture	○	○	○	○	○	○
Q7af3 Multiple values of the forest ecosystem	○	○	○	○	○	○
Q7ag3 National parks, strict nature reserves, "hot spots", endemics, relics	○	○	○	○	○	○
Q7ah3 Renewable energy sources, their potential in Montenegro	○	○	○	○	○	○
Q7ai3 Industry as	○	○	○	○	○	○

a source of environmental pollution						
Q7aj3 Genetic engineering in biotechnology, gene therapy	○	○	○	○	○	○
Q7ak3 Sustainable tourism	○	○	○	○	○	○
Q7al3 Importance of waste as a resource	○	○	○	○	○	○
Q7am3 Noise sources and negative impacts on human health	○	○	○	○	○	○
Q7an3 Importance, composition and sources of air pollution	○	○	○	○	○	○
Q7ao3 Acid rain and its impact	○	○	○	○	○	○
Q7 ap3 Importance of	○	○	○	○	○	○

rational use of natural resources						
Q7aq3 Importance of coodination between economic and environmental interests	○	○	○	○	○	○
Q7ar3 Ecoremediation	○	○	○	○	○	○
Q7as3 Sustainable cities, settlements, and rural environments	○	○	○	○	○	○
Q7at3 "Green" traffic	○	○	○	○	○	○
Q7au3 Causes of natural disasters	○	○	○	○	○	○
Q7av3 Biological hazards	○	○	○	○	○	○
Q7aw3 Consequences of unplanned exploitation of rivers and lakes in	○	○	○	○	○	○

Montenegro						
Q7ax3 Importance of the sea, sources of pollution, and methods of its protection	○	○	○	○	○	○
Q7ay3 Respect for diversity, the difference between sex and gender	○	○	○	○	○	○
Q7az3 Empathy	○	○	○	○	○	○
Q7ba3 Sexually transmitted diseases	○	○	○	○	○	○
Q7bb3 Role of the individual in creating a healthy environment	○	○	○	○	○	○
Q7bc3 Basic principles of democracy	○	○	○	○	○	○
Q7bd3 Institutions of the European Union, advantages and disadvantages	○	○	○	○	○	○

of Montenegro's
entry into the
European Union

Q8 3 - I finished:

Q8a3 high school in Montenegro

Q8b3 four-year high vocational school in Montenegro

Q8c3 high school outside the borders of Montenegro

Statement of authorship

Name and surname: MSc Snežana Lješnjak

Index number: 1/21

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Snežana Gvozdenac

Author Biography

Snežana Lješnjak was born on April 24, 1986, in Podgorica. After completing elementary school at "Maksim Gorki" and high education at Medical High School, she enrolled in the Faculty of Natural Sciences and Mathematics in Podgorica, Department of Biology, in 2004. She completed a three-year biology program in 2007 with an average grade of 9.2, earning the title of Bachelor of Biology. In 2008, she completed an additional year of study with an average grade of 9.95, obtaining the title Specialist in Biology.

In 2008/2009, she commenced her master's studies at the Faculty of Natural Sciences and Mathematics, University of Montenegro, specializing in Ecology and environmental protection. She achieved an average grade of 10 and defended her master's thesis titled "Ecological Education in Nature Classes in the Second Cycle of Nine-Year Elementary School" in May 2009, earning the title of Master of Ecology and Environmental Protection.

During her studies, Snežana was awarded scholarships from the Municipality of Nikšić and the Ministry of Education. Since 2011, she has been working as a biology teacher in an elementary school and has been involved in numerous state projects related to education.

She is the mother of Maša and Iskra.