INSTITUTU ZA INTERDISCIPLINARNE I MULTIDISCIPLINARNE STUDIJE
UNIVERZITETA CRNE GORE
Studijski program: "ODRŽIVI RAZVOJ"
CENTRU ZA DOKTORSKE STUDIJE UNIVERZITETA CRNE GORE
SENATU UNIVERZITETA CRNE GORE

Predmet: Zahtjev za ocjenu doktorske disertacije

Poštovani,

U skladu sa Pravilima studiranja na doktorskim studijama Univerziteta Crne Gore podnosim Zahtjev za ocjenu doktorske disertacije pod nazivom: *„Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro"*, naziv doktorske disertacije na službenom jeziku: *„Implementacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori"*.

Uz Zahtjev prilažem:
1. Pismenu saglasnost prvog i drugog mentora da rad zadovoljava sve kriterijume doktorske disertacije;
2. Predlog komisije za pregled i ocjenu doktorske disertacije;
3. Dva štampana primjerka doktorske disertacije sa potpisanim izjavama o autorstvu, istovjetnosti štampane i elektronske verzije i o korišćenju;
4. Kopiju naučnog rada publikovanog u časopisu sa odgovarajuće liste;
5. Elektronsku verziju doktorske disertacije i publikovanog naučnog rada na CD-u;
6. Biografiju i bibliografiju kandidata;
7. Odluku o izboru u zvanje, biografiju i bibliografiju članova Komisije za ocjenu doktorske disertacije sa dokazom da jedan član Komisije nije u radom odnosu na Univerzitetu Crne Gore;

S poštovanjem,
mr Snežana Lješnjak
Snežana Lješnjak

Datum: 30. 8. 2024.

INSTITUTE FOR INTERDISCIPLINARY AND MULTIDISCIPLINARY STUDIES
UNIVERSITY OF MONTENEGRO
Study Program: "SUSTAINABLE DEVELOPMENT"
CENTER FOR DOCTORAL STUDIES, UNIVERSITY OF MONTENEGRO
SENATE OF THE UNIVERSITY OF MONTENEGRO

Subject: Request for Evaluation of Doctoral Dissertation

Following the Rules for Doctoral Studies at the University of Montenegro, I submit this Request for the evaluation of the doctoral dissertation titled: "*Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro,* " with the official title in the official language: "Implementacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori."

Attached to this Request are:

1. Written consent from the first and second mentors confirming that the dissertation meets all the criteria for a doctoral dissertation;
2. Proposal for the committee for the review and evaluation of the doctoral dissertation;
3. Two printed copies of the doctoral dissertation with signed statements of authorship, the authenticity of the printed and electronic versions, and usage;
4. A copy of the scientific paper published in a journal from the appropriate list;
5. Electronic version of the doctoral dissertation and published scientific paper on a CD;
6. Curriculum Vitae and bibliography of the candidate;
7. Decision on appointment to the rank, Curriculum Vitae, and bibliography of the members of the Dissertation Evaluation Committee, with proof that one member of the Committee is not employed at the University of Montenegro.

Respectfully,
Snežana Lješnjak, MSc Snežana Lješnjak

30.8.2024.

INSTITUTU ZA INTERDISCIPLINARNE I MULTIDISCIPLINARNE STUDIJEUNIVERZITETA CRNE GORE

Studijski program: „Održivi razvoj"

CENTRU ZA DOKTORSKE STUDIJE UNIVERZITETA CRNE GORE

SENATU UNIVERZITETA CRNE GORE

Na osnovu člana 37. Pravila doktorskih studija Univerziteta Crne Gore, dajemo sledeću

SAGLASNOST

Ovim putem dajemo saglasnot da doktorska disertacija pod nazivom: *„Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro"*, naziv na službenom jeziku: *„Implementacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori"*, autorke mr Snežane Lješnjak zadovoljava kriterijume doktorske disertacije propisane Statutom Univerziteta Crne Gore i Pravilima doktorski studija Univerziteta Crne Gore.

Mentor:

dr Danka Caković

DCaković

Ko-mentor:

dr Andrej Šorgo Andrej Šorgo Digitalno podpisal Andrej Šorgo Datum: 2024.08.27 07:17:51 +02'00'

U Podgorici, 30.8. 2024.

INSTITUTE FOR INTERDISCIPLINARY AND MULTIDISCIPLINARY STUDIESUNIVERSITY OF MONTENEGRO

Study Program: "Sustainable Development"

CENTER FOR DOCTORAL STUDIES, UNIVERSITY OF MONTENEGRO

SENATE OF THE UNIVERSITY OF MONTENEGRO

Following Article 37 of the Rules for Doctoral Studies at the University of Montenegro, we provide the following

APPROVAL

We give our approval that the doctoral dissertation titled: *"Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro,"* with the official title in the official language: "Implementacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori," authored by MSc Snežana Lješnjak, meets the criteria for a doctoral dissertation as stipulated by the Statute of the University of Montenegro and the Rules for Doctoral Studies at the University of Montenegro.

Mentor:

Danka Caković, PhD Caković

Co-mentor:

Andrej Šorgo, PhD Andrej Šorgo Digitalno podpisal Andrej Šorgo Datum: 2024.08.27 07:18:51 +02'00'

In Podgorica, 30. 8. 2024.

ISPUNJENOST USLOVA DOKTORANDA

OPŠTI PODACI O DOKTORANDU	
Titula, ime, ime roditelja,	mr Snežana Miladina Lješnjak
Fakultet	Institut za interdisciplinarne i multidisciplinarne studije Univerziteta Crne Gore
Studijski program	Održivi razvoj
Broj indeksa	1/21

NAZIV DOKTORSKE DISERTACIJE	
Na službenom jeziku	Implementacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori
Na engleskom jeziku	Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro
Naučna oblast	Metodika nastave, održivi razvoj

MENTOR/MENTORI			
Prvi mentor	Prof. dr Danka Caković	Univerzitet Crne Gore	Ekologija i sistematika biljaka, Metodika nastave biologije
Drugi mentor	Prof. dr Andrej Šorgo	Univerzitet u Mariboru, Slovenija	Didaktika, Informacione tehnologije u obrazovanju

KOMISIJA ZA PREGLED I OCJENU DOKTORSKE DISERTACIJE		
Dr Anđelka Šćepanović, vanredni profesor, predsjednica komisije	Univerziet Crne Gore	Grupa opštih bioloških predmeta, Humana ekologija, Razvoj djeteta
Dr Danilo Mrdak, redovni profesor, član komisije	Univerziet Crne Gore	Ihtiologija, Konzervaciona biologija, Održivi razvoj
Dr Dijana Vučković, vanredni profesor, član komisije	Univerziet Crne Gore	Metodika nastave crnogorskog-srpskog, bosanskog, hrvatskog jezika i književnosti, Metodika razvoja govora
Dr Danka Caković, redovni profesor, član komisije (mentor)	Univerziet Crne Gore	Ekologija i sistematika biljaka, Metodika nastave biologije
Dr Andrej Šorgo, redovni profesor, komisije (ko-mentor)	Univerzitet u Mariboru, Slovenija	Didaktika, Informacione tehnologije u obrazovanju

Datum značajni za ocjenu doktorske disertacije	
Sjednica Senata na kojoj je data saglasnost na ocjenu teme i kandidata	22. 12. 2022.
Dostavljanja doktorske disertacije organizacionoj jedinici i saglasanost mentora	30.8.2024.

Sjednica Vijeća organizacione jedinice na kojoj je dat prijedlog za imenovanje komisija za pregled i ocjenu doktorske disertacije	

ISPUNJENOST USLOVA DOKTORANDA

U skladu sa članom 38 pravila doktorskih studija kandidat **je** dio sopstvenih istraživanja vezanih za doktorsku disertaciju publikovao u časopisu sa **SCI** liste kao prvi autor:

Lješnjak, S., Caković, D., & Šorgo, A. (2024). Familiarity and opinions of Montenegrin basic school leavers toward education for sustainable development. *Journal of Baltic Science Education, 23*(4), 679–693. https://doi.org/10.33225/jbse/24.23.679

SCI list
Quartile: Q2
Impact factor: 1.54
Publisher: Scientific Methodical Center

Spisak radova doktoranda iz oblasti doktorskih studija koje je publikovao

Lješnjak, S., Caković, D., & Šorgo, A. (2024). Familiarity and opinions of Montenegrin basic school leavers toward education for sustainable development. *Journal of Baltic Science Education, 23*(4), 679–693. https://doi.org/10.33225/jbse/24.23.679

Lješnjak, S., Šorgo, A., Lang V., Caković, D. (2022). Implementation of the curriculum of Education for sustainable development in elementary and high schools teachers' work in Montenegro. Proceedings of the 1st Doctoral Colloquium on Sustainable Development", DOC-ME'2022, 22nd and 23rd Sep 2022, Kotor, Montenegro

Obrazloženje mentora o korišćenju doktorske disertacije u publikovanim radovima

Mr Snežana Lješnjak je dio rezultata istraživanja iz doktorske disertacije objavila u časopisu indeksiranom na SCI listi, a ostali rezultati su u procesu recenziranja u časopisima sa SCI liste.

Rad objavljen u Journal of Baltic Science Education, pod naslovom "Familiarity and opinions of Montenegrin basic school leavers toward Education for Sustaninable Development", koautora prof.dr Danka Caković i prof. dr Andrej Šorgo, predstavlja dio istraživanja iz doktorske disertacije koji je sproveden sa ciljnom grupom 2 (učenicima prvog razreda srednje škole). U uvodnom dijelu su data početna razmatranja koja se tiču međunarodnih istraživanja, nakon čega su predstavljene karakteristike obrazovnog sistema u Crnoj Gori i Međupredmetnog programa-obrazovanje za održivi razvoj za osnovnu školu. Nakon toga je detaljno objašnjena metodologija istraživanja, kao i rezultati iz koje je proizašla diskusija i zaključci. Rezultati pokazuju značajan nedostatak poznavanja sadržaja iz kurikuluma obrazovanja za održivi razvoj među učenicima koji su završili osnovnu školu, kao i da su ti sadržaji rijetko integrisani u nastavu. Ispitanici su uglavnom bili neutralni u vezi sa ovom temom, bez jasnog većinskog stava prema važnosti održivog razmišljanja i djelovanja.

Mentori su saglasni da je Snežana Lješnjak ispunila sve zahtjeve da pređe na sledeći proceduralni korak, odnosno da se imenuje Komisija za pregled i ocjenu doktorske disertacije.

Stoga smo dali saglasnost u okviru koje navodimo da je Snežana Lješnjak zadovoljila kriterijume doktorske disertacije propisane Statutom Univerziteta Crne Gore i Pravilima doktorskih studija.

Andrej Šorgo

Digitalno podpisal Andrej Šorgo
Datum: 2024.08.27 11:20:31 +02'00'

D Caković

Datum i ovjera (pečat i potpis odgovorne osobe)
U Podgorici, _____2024. DEKAN/DIREKTOR _____ MP

Prilog dokumenta sadrži:

1. Potvrdu o predaji doktorske disertacije organizacionoj jedinici
2. Odluku o imenovanju komisije za pregled i ocjenu doktorske disertacije
3. Kopiju rada publikovanog u časopisu sa odgovarajuće liste
4. Biografiju i bibliografiju kandidata
5. Biografiju i bibliografiju članova komisije za pregled i ocjenu doktorske disertacije sa potvrdom o izboru u odgovarajuće akademsko zvanje i potvrdom da barem jedan član komisije nije u radnom odnosu na Univerzitetu Crne Gore

Important Metrics and Factor

Title	Journal of Baltic Science _Education
Abbreviation	J. Balt. Sci. Educ.
Publication Type	Journal
Subject Area, Categories, Scope	Education (Q2)
h-index	22
Overall Rank/Ranking	12778
SCImago Journal Rank (SJR)	0.388
Impact Score	1.54
Publisher	Scientific Methodical Center
Country	Lithuania
ISSN	16483898
Best Quartile	Q2
Coverage History	2008-2022

UCG

UNIVERSITY OF MONTENEGRO
Form D2: Compliance of Doctoral Candidate Requirements

COMPLIANCE OF DOCTORAL CANDIDATE REQUIREMENTS

GENERAL INFORMATION ABOUT THE DOCTORAL CANDIDATE	
Title, First Name, Father's Name, Last Name	MSc Snežana Miladina Lješnjak
Faculty	Institute for Interdisciplinary and Multidisciplinary Studies, University ofMontenegro
Study Program	Sustainable Development
Idex number	1/21
TITLE OF THE DOCTORAL DISSERTATION	
In the official language	Implementacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori
In English	Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro
Scientific Field	Teaching methodology, sustainable development

MENTOR(S)			
First Mentor:	Professor Dr. Danka Caković	University of Montenegro	Ecology and systematics of plants, Biology teaching methodology
Second Mentor:	Professor Dr. Andrej Šorgo	University of Maribor, Slovenia	Didactics, Information technologies in education

COMMITTEE FOR REVIEW AND EVALUATION OF THE DOCTORAL DISSERTATION		
PhD Anđelka Šćepanović, Associate Professor, Chair of the Committee	University of Montenegro	Group of General Biological Subjects, Human Ecology, Child Development
PhD Danilo Mrdak, Full Professor, Member of the Committee	University of Montenegro	Ichthyology, Conservation biology, Sustainable development
PhD Dijana Vučković, Associate Professor, Member of the Committee	University of Montenegro	Methodology of teaching Montenegrin-Serbian, Bosnian, and Croatian language, Methodology of speech development

PhD Danka Caković, Full Professor, Member of the Committee (mentor)	University of Montenegro	Ecology and systematics of plants, Biology teaching methodology
PhD Andrej Šorgo, Full Professor, Member of the Committee (co-mentor)	University of Maribor, Slovenia	Didactics, Information technologies in education

DATES RELEVANT TO THE EVALUATION OF THE DOCTORAL	
Senate session where approval was given for the evaluation of the title and candidate	22. 12. 2022.
Submission of the doctoral dissertation to the organizational unit and mentor's approval	30. 8. 2024
Council session of the organizational unit where the proposal for the appointment of the evaluation committee was given	

COMPLIANCE OF DOCTORAL CANDIDATE REQUIREMENTS

In accordance with Article 38 of the Rules for Doctoral Studies, the candidate has/has not published all or part of their research related to the doctoral dissertation in a journal from the (SCI/SCIE)/(SSCI/A&HCI) list as the first author.

Lješnjak, S., Caković, D., & Šorgo, A. (2024). Familiarity and opinions of Montenegrin basic school leavers toward education for sustainable development. *Journal of Baltic Science Education, 23*(4), 679–693. https://doi.org/10.33225/jbse/24.23.679

SCI list
Quartile: Q2
Impact factor: 1.54
Publisher: Scientific Methodical Center

List of the candidate's works in the field of doctoral studies published

Lješnjak, S., Caković, D., & Šorgo, A. (2024). Familiarity and opinions of Montenegrin basic school leavers toward education for sustainable development. *Journal of Baltic Science Education, 23*(4), 679–693. https://doi.org/10.33225/jbse/24.23.679

Lješnjak, S., Šorgo, A., Lang V., Caković, D. (2022). Implementation of the curriculum of Education for sustainable development in elementary and high schools teachers' work in Montenegro. Proceedings of the 1st Doctoral Colloquium on Sustainable Development", DOC-ME'2022, 22nd and 23rd Sep 2022, Kotor, Montenegro

Mentor's explanation of the use of the doctoral dissertation in published papers

MSc Snežana Lješnjak has published part of the results from her doctoral research in a journal indexed on the SCI list, while the remaining results are currently under review in journals from the SCI list.

The paper published in the Journal of Baltic Science Education, titled "Familiarity and Opinions of Montenegrin Basic School Leavers Toward Education for Sustainable Development," co-authored by Prof. Dr. Danka Caković and Prof. Dr. Andrej Šorgo, represents a portion of the doctoral research conducted with the target group 2 (first-year high school students). The introduction provides initial considerations related to international research, followed by an overview of the educational system in Montenegro and the Interdisciplinary Program - Education for Sustainable Development for elementary school. The paper then details the research methodology and presents results, leading to a discussion and conclusions. The findings indicate a significant lack of knowledge about the Education for Sustainable Development curriculum among students who have completed primary school, as well as the rare integration of these contents into teaching. The respondents were generally neutral on this topic, with no clear majority stance on the importance of sustainable thinking and actions.

The mentors agree that Snežana Lješnjak has met all the requirements to proceed to the next procedural step, namely the appointment of the Committee for the review and evaluation of the Doctoral Dissertation.

Therefore, we have given our consent, stating that Snežana Lješnjak has fulfilled the criteria for the doctoral dissertation as prescribed by the Statute of the University of Montenegro and the Rules of Doctoral Studies.

Andrej Sorgo

Dlaković

Date and Certification
DEAN/DIRECTOR MP

Document Attachments:

1. Confirmation of submission of the doctoral dissertation to the organizational unit
2. Decision on the appointment of the committee for the review and evaluation of the doctoral dissertation
3. Copy of the paper published in a journal from the appropriate list
4. Curriculum Vitae and bibliography of the candidate
5. Curriculum Vitae and bibliography of the members of the committee for the review and evaluation of the doctoral dissertation with confirmation of appointment to the relevant academic rank and confirmation that at least one committee member is not employed at the University of Montenegro

Important Metrics and Factor

Title	Journal of Baltic Science _Education
Abbreviation	J. Balt. Sci. Educ.
Publication Type	Journal
Subject Area, Categories, Scope	Education (Q2)
h-index	22
Overall Rank/Ranking	12778
SCImago Journal Rank (SJR)	0.388
Impact Score	1.54
Publisher	Scientific Methodical Center
Country	Lithuania
ISSN	16483898
Best Quartile	Q2
Coverage History	2008-2022

INSTITUTU ZA INTERDISCIPLINARNE I MULTIDISCIPLINARNE

STUDIJEUNIVERZITETA CRNE GORE

Studijski program: „Održivi razvoj"

CENTRU ZA DOKTORSKE STUDIJE UNIVERZITETA CRNE GORE

SENATU UNIVERZITETA CRNE GORE

Predmet: Predlog komisije za pregled i ocjenu doktorske disertacije kandidatkinje mr Snežane Lješnjak

Poštovani,

Molimo Vas da imenujete komisiju za pregled i ocjenu doktorske disertacije pod nazivom: *"Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro"*, naziv na maternjem jeziku: *"Implemenacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori"* kandidatkinje mr Snežane Lješnjak u sledećem sastavu:

1. Dr Andelka Šćepanović, vanredna profesorica Prirodno-matematičkog fakulteta Univerziteta Crne Gore (naučna oblast – Grupa opštih bioloških predmeta, Humana ekologija, Razvoj djeteta) - predsjednica komisije;
2. Dr Danilo Mrdak, redovni profesor Prirodno-matematičkog fakulteta Univerziteta Crne Gore (naučna oblast - Ihtiologija, Konzervaciona biologija, Održivi razvoj) - član komisije;
3. Dr Dijana Vučković, vanredna profesorica Filozofskog fakulteta Univerziteta Crne Gore (naučna oblast - Metodika nastave crnogorskog-srpskog, bosanskog, hrvatskog jezika i književnosti, Metodika razvoja govora) - članica komisije;
4. Dr Danka Caković, redovna profesorica Prirodno-matematičkog fakulteta Univerziteta Crne Gore (naučna oblast – Ekologija biljaka, Sistematika biljaka, Metodika nastave biologije) - mentorka;
5. Dr Andrej Šorgo, redovni profesor Prirodno-matematičkof fakulteta Univerziteta u Mariboru, Slovenija (Metodika nastave biologije, Obrazovanje o životnoj sredini) - komentor.

Mentor:

dr Danka Caković

Dlaković

Komentor:

dr Andrej Šorgo

Andrej Šorgo

Digitalno podpisal Andrej Šorgo
Datum: 2024.08.27 07:21:29 -02'00'

U Podgorici, 30.8. 2024.

TO THE INSTITUTE FOR INTERDISCIPLINARY AND MULTIDISCIPLINARY STUDIESUNIVERSITY OF MONTENEGRO

Study Program: "Sustainable Development"

TO THE CENTER FOR DOCTORAL STUDIES AT THE UNIVERSITY OF MONTENEGRO

TO THE SENATE OF THE UNIVERSITY OF MONTENEGRO

Subject: Proposal of the commission for the review and evaluation of the doctoral dissertation by candidate Snežana Lješnjak, MSc

We kindly request that you appoint a commission for the review and evaluation of the doctoral dissertation titled: *"Implementation of the Education for Sustainable Development in Elementary and High Schools in Montenegro,"* in the original language: "Implementacija obrazovanja za održivi razvoj u osnovnim i srednjim školama u Crnoj Gori," by candidate Snežana Lješnjak, M.Sc., with the following members:

1. PhD Andelka Šćepanović, Associate Professor at the Faculty of Natural Sciences and Mathematics, University of Montenegro (scientific field - Group of general biological subjects, Human Ecology, Child Development) - Chair of the commission;
2. PhD Danilo Mrdak, Full Professor at the Faculty of Natural Sciences and Mathematics, University of Montenegro (scientific field - Ichthyology, Conservation biology, Sustainable development) - Member of the commission;
3. PhD Dijana Vučković, Associate Professor at the Faculty of Philosophy, University of Montenegro (scientific field - Methodology of teaching Montenegrin-Serbian, Bosnian, Croatian language and literature, Methodology of speech development) - Member of the commission;
4. PhD Danka Caković, Full Professor at the Faculty of Natural Sciences and Mathematics, University of Montenegro (scientific field - Ecology, Plant systematics, Methodology of biology teaching) - Mentor;
5. PhD Andrej Šorgo, Full Professor at the Faculty of Natural Sciences and Mathematics, University of Maribor, Slovenia (Methodology of biology teaching, Environmental education) - Co-mentor.

Mentor:

PhD Danka Caković

Caković

Co-mentor:

PhD Andrej Šorgo

Andrej Šorgo Digitalno podpisal Andrej Šorgo Datum: 2024.08.27 07:22:10 +02'00'

In Podgorica,_____2024.

JOURNAL OF BALTIC SCIENCE EDUCATION

ISSN 1648-3898 (Print)
ISSN 2538-7138 (Online)

FAMILIARITY AND OPINIONS OF MONTENEGRIN BASIC SCHOOL LEAVERS TOWARD EDUCATION FOR SUSTAINABLE DEVELOPMENT

Snežana Lješnjak,
Danka Caković,
Andrej Šorgo

Abstract. *This study aimed to explore the familiarity with and opinions toward Education for Sustainable Development (ESD) among Montenegrin students at the end of their basic school years and upon entering upper-secondary school. The participants of the study were gathered in 2022, and the data were recorded via an online survey platform. The results were obtained from 705 students in the first grade of upper-secondary school. The results indicate a notable lack of student familiarity with the content of the ESD curriculum, despite it being a compulsory part of the basic school since 2014. The content listed in the curriculum of ESD for basic school is only sporadically or rarely integrated into teaching practice. Respondents mostly showed a neutral opinion toward the ESD content and its implementation practices. They did not demonstrate a clear majority opinion toward embracing sustainable thinking and behavior. Based on the study findings, there is an urgent need for comprehensive teacher training in all subjects for basic school teachers. The study recommends developing effective assessment tools for ESD concepts, providing teaching materials, and appropriate literature to integrate ESD content into each subject, ensuring the competent achievement of ESD goals.*

Keywords: *Education for Sustainable Development, Sustainable Development Goals, Montenegro, basic school leavers*

Snežana Lješnjak,
Elementary School "Marko Miljanov", Montenegro
Danka Caković
University of Montenegro, Montenegro
Andrej Šorgo
University of Maribor, Slovenia

Introduction

It is easy to see that solutions to many global challenges related to unsustainable human activities remain unresolved due to the failure to negotiate workable solutions between different stakeholders. Therefore, to effectively address the pressing global need for sustainability (Meadows, 2014), it is crucial not only to advance policies, technologies, and practices but also to focus on fostering the action competence of individuals as key agents of change (Jensen & Schnack, 2006; Arbuthnott, 2009; UN, 2015). However, to be effective and universal, education for sustainability should not rely on individual efforts by enthusiastic teachers, but on the efforts of entire educational systems. The backbone of education for sustainability at the state level is the national curriculum, which should be analyzed from different angles, including the students' perspective.

Even though adults have significant decision-making power, the influence of children who have recently entered basic and secondary schools on the acceptance of global sustainable and environmentally friendly practices should not be underestimated, as figures such as Greta Thunberg demonstrate (Sabherwal et al., 2021; Samuelsson & Kaga, 2008). Today's students are the future decision-makers, and it is therefore crucial to educate them in such a way that they develop the competencies for effective action when needed. While it is impossible to be completely certain about the value of the knowledge and skills taught today in the distant future, it is certain that at least some of them will be needed to deal with devastating environmental problems. Although the specific knowledge and skills taught today may evolve as technology advances and environmental challenges emerge, the opinions and attitudes towards sustainable living remain a constant that should be promoted through the coordinated efforts of the education system and other environmentally conscious agents of change.

Therefore, studies of curriculum components and participants' experiences and perspectives at the system-wide level are needed to provide policymakers with insights into what works in education at the state or country level so that they can implement policies and strategies for better learning outcomes in the school system.

https://doi.org/10.33225/jbse/24.23.679

ISSN 1648-3898 (Print)
ISSN 2538-7138 (Online)

Education for Sustainable Development

The need for education for sustainable development stems from the realization that persistent and often unsustainable human activities have led to a range of serious, even catastrophic, environmental problems. Reflecting an era in which human activities such as resource exploitation, pollution, urbanization, and the fragmentation of natural habitats contribute to climate change, biodiversity loss, and crises, such as uncontrolled migrations, among other things, the term 'Anthropocene' has been coined to refer to the most recent geological epoch (Steffen et al., 2011). Living in the Anthropocene, where humans are both causes and victims of environmental problems, makes it necessary to find solutions that promote sustainable practices (Ruggerio, 2021).

Recognizing the urgency of global environmental protection, various international summits have been held since the mid-20th century, including the UN Conference on the Human Environment in Stockholm (UN, 1972), the UN Conference on Environment and Development in Rio de Janeiro (UN, 1992), the World Summit on Sustainable Development in Johannesburg (UN, 2002), the UN Conference on Sustainable Development in Rio de Janeiro (UN, 2012), and the 2015 UN Sustainable Development Summit in New York (UN, 2015), where the 2030 Agenda for Sustainable Development was adopted. The Agenda for Sustainable Development offers a common blueprint for peace and prosperity for people and the planet now and in the future. At its center are 17 Sustainable Development Goals (SDGs) with 169 targets that represent an urgent call to action for all countries in a global partnership. However, despite global awareness and efforts around the SDGs, the latest evidence suggests that many of the proposed SDGs are unlikely to be achieved by 2030 (Weitz et al., 2023).

Sustainable development can be thought of in three dimensions (pillars): the environment, the economy, and society (Berglund & Gericke, 2015; UN, 2015). These three pillars of sustainability are an essential part of Sustainable Development Goal 4 – Quality Education (SDG 4). SDG 4 has seven targets and three means of implementation. Of the targets of SDG 4, only target 4.7 (Education for Sustainable Development and Global Citizenship) focuses on sustainable development. Due to its importance, it is quoted verbatim (UN, 2023):

> "By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture contribution to sustainable development."

However, among the proposals to implement SDG 4, there is a lack of actionable suggestions in international documents that can be applied by individual teachers to improve education, especially to achieve target 4.7. Recognizing that education is an important tool to promote sustainability, a goal of humanity reflected in the Sustainable Development Goals (UN, 2015), two main objectives can be attributed to education systems and the institutions working within them. The first objective is to bring young people closer to the material, social, cultural, and economic environment that surrounds them. Understanding planet Earth as an interconnected ecosystem is essential for developing informed solutions that result in sustainability. Solutions targeting local problems caused by global, unsustainable practices are curative; preventive measures that address the root causes of these problems are often postponed to an indefinite future, which highlights the second objective: teaching the importance of proactive change. Therefore, understanding and recognizing the Anthropocene is crucial for developing sustainable practices and strategies to mitigate the negative impact of human activities on the planet. It emphasizes the need for responsible and informed decision-making to ensure sustainable coexistence with our environment, which is a challenge for humanity (Folke et al., 2021). In response to these challenges, the 2023 SDG Summit was convened in New York, marking the beginning of a new phase of accelerated progress on the SDGs with high-level political guidance for transformative and accelerated action by 2030. In this process, all information about what has worked well and what has gone wrong in education should be scrutinized to create a better future.

Education for Sustainable Development (ESD) can be interpreted in different ways depending on the perspective (Haubrich, 2007). ESD refers to a method of meeting the needs of the present without jeopardizing the ability of future generations to meet their own needs. Environmental literacy encompasses five important facets: knowledge, awareness, behavior, commitment, and attitude (Jannah et al., 2013; Partanen-Hertell et al., 1999). It is an educational approach that aims to equip people with the knowledge, skills, values, and attitudes necessary to contribute to a more sustainable and equitable world (UNESCO, 2005). Numerous studies have addressed the question of how to implement ESD from early childhood education to higher education, using various approaches

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to improve learning. These approaches include the use of school gardens or ecological gardens (Tal & Morag, 2009), the inclusion of storytelling (Nerantzaki, 2016), the assessment of students' sustainability competences (Waltner et al., 2019), the application of systems thinking through participatory methods (Kioupi & Voulvoulis, 2019), the implementation of active learning activities for recycling (Buil-Fabregá et al., 2019), the use of educational games (Gandini et al., 2019), the promotion of extracurricular activities focusing on reflective learning (Díaz-Iso et al., 2019), the introduction of the flipped classroom as an active learning method (Buil-Fabregá et al., 2019), the design of effective learning environments (Sinakou et al., 2019), and the promotion of students' agency (Chen & Liu, 2020), among others.

The Montenegrin School System

Education is widely recognized as a foundation of social development. In Montenegro, a series of ongoing reforms have been undertaken to align the education system with contemporary trends and quality standards. These reforms have touched upon all levels of the education system, signifying a commitment to ensuring that Montenegrin education remains responsive to the evolving needs of its society.

Basic school in Montenegro, encompassing both primary (ISCED 1) and lower secondary (ISCED 2) levels, is organized as a single-structure system and holds a central place in the nation's educational landscape. It is intended to be both compulsory and freely accessible to all children aged between 6 and 15. This educational phase spans nine years and is divided into three distinct cycles. Students with special educational requirements receive their basic education in schools and support centers, ensuring that inclusivity remains a core principle.

Montenegro's public education institutions offer basic nine-year education services through a network of 162 schools, two educational centers, and three support centers. Additionally, four private schools have been granted licenses to operate in the country (Eurydice, 2023a; Eurydice, 2023b).

Content and Objectives of the Education for Sustainable Development Curriculum in Basic Schools in Montenegro

During the 27th session held on March 17, 2014, the National Council for Education established a crucial initiative known as "Education for Sustainable Development-Cross-Curricular Area" within subject programs for Montenegrin nine-year compulsory basic schools. As a premise for its inclusion in the curriculum, it was recognized that Education for Sustainable Development is inherently multidisciplinary because no single subject can comprehensively cover all the essential content required to equip students with the knowledge and skills necessary for a sustainable future (Čabrilo et al., 2014).

To implement the cross-curricular model of Education for Sustainable Development, specific topics have been defined to promote an integrative approach to general education and create stronger links between subject areas. This approach fosters the development of key competences in students. In line with Montenegrin priorities and traditions and taking into account international strategic documents in the field of ESD, eight cross-curricular topics (CCTs) have been identified. 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

The Education for Sustainable Development curriculum for basic school presents operational objectives, student activities, timetables, and content for each topic and specifies the subjects in which these objectives are to be achieved. Overall, it can be stated that the curriculum covers all compulsory subjects that students learn during their nine years of basic school (Čabrilo et al., 2014).

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Research Problem

As the pursuit of a sustainable future is a fundamental goal for humanity, realizing the moral imperatives enshrined in the SDGs requires coordinated action at all levels and demands a transformative change in various areas of human endeavor. Education has an undeniable role to play in this ambitious endeavor, serving a dual purpose. Quality education is emphasized by the United Nations as one of the 17 SDGs (UN, 2015). Scholars highlight its potential as a tool to prepare future professionals who will innovate for a world where economic, social, and environmental aspects coexist harmoniously (Guerra, 2017; Sandri et al., 2018; Sivapalan, 2016). According to Svanström et al. (2018) and UNESCO (2018; 2020), these professionals require key competencies such as systems thinking, foresight skills, normative understanding, strategic thinking, collaboration, critical thinking, self-awareness, and integrated problem-solving. This perspective aligns with the definition of ESD, which emphasizes that activities meeting the needs of current generations must not compromise the needs of future generations (Brundtland, 1987; Camioto et al., 2017; Gbededo et al., 2018; Leal Filho et al., 2018). In this context, ESD stands out as a transformative process. The role of education in achieving the SDGs is crucial (Kopnina, 2020), as it acts as both a catalyst for environmentally conscious human action and a driving force for sustainable development (Pogge, 2004). The central role of educators as important catalysts of change (Hattie, 2003; Priestley et al., 2013) and the recognized influence of their beliefs (Biesta et al., 2015) are also well-documented.

Despite decades of commitment, the implementation of environmental education, sustainability education, and educational frameworks aligned with the SDGs remains a challenge, not only in Montenegro (Government of Montenegro, 2022) but also for the international community as a whole (OECD, 2023). The realization of the SDGs, which embody this vision, remains elusive due to various factors (Vladimirova & Le Blanc, 2016). Differing viewpoints and resolutions, as highlighted by Annan-Diab and Molinari (2017) and Kopnina (2020), reflect a range of perspectives that can sometimes diverge from the experiences of educators, schools, and communities.

The genesis of this study lies in informal dialogues with teachers, revealing concerns that Education for Sustainable Development (ESD) in Montenegro is inadequately implemented in nine-year basic schools. Thus, there exists a significant gap in understanding the current state of ESD curriculum implementation. Heberlein's (2012) three-pronged approach to environmental problem-solving—technological, systemic, and cognitive—illustrates that while changes in environmental practices arise from the first two dimensions, sustainable transformation hinges on the cognitive domain. In the Montenegrin educational context, formal environmental education in basic and secondary schools effectively addresses technological and systemic aspects. Montenegro boasts a network of public schools with well-trained educators, and the curriculum incorporates ESD principles. Another compelling reason for this research is the lack of prior examination into the implementation of ESD programs in Montenegro, despite their introduction in 2014. The aim of the study is to monitor the implementation of the ESD curriculum in basic schools by assessing the familiarity of students who have just completed it, as well as their opinions towards it. Additionally, this research aims to evaluate how effectively these programs have been integrated into everyday pedagogical practices across subjects.

Research Aim and Research Questions

In countries like Montenegro, where research resources are limited, there is a significant lack of foundational studies on sustainability education. Therefore, this study aimed to address this gap by analyzing students' familiarity with and direct opinions of Education for Sustainable Development (ESD) throughout their nine years of basic school. The study also sought to explore their perspectives on the meaning and practices associated with ESD.

Based on this aim, the following research questions were formulated to guide the study:

RQ1: Familiarity with CCTs: To what extent and through which channels are basic school students familiarized with Cross-Curricular Topics (CCTs)?

RQ2: Integration of ESD content: How frequently is ESD content integrated into basic school lessons?

RQ3: Students' opinions towards ESD: What are basic school students' opinions regarding the integration of ESD content into lessons?

By addressing these questions, valuable insights can be gained into the effectiveness of ESD implementation in Montenegrin basic schools. The findings inform evidence-based recommendations for improvements to educational authorities.

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Research Methodology

General Background

This study is an integral part of the broader research project titled "Implementation of Education for Sustainable Development in Basic and Upper Secondary Schools in Montenegro." For this study, an online survey approach was implemented using a questionnaire. The aim of the questionnaire was twofold: a) to collect information on Montenegrin basic school students' familiarity with various topics included in the national curriculum for Education for Sustainable Development, and b) to gather student opinions upon completing basic school regarding the curriculum topics and their integration into lessons. Data collection commenced on September 17 and concluded on November 17, 2022. It is important to emphasize that student participation in the survey was voluntary and anonymous.

Given that the participants in this study are minors, permission to conduct the research was obtained from the Ministry of Education of Montenegro. Additionally, the study's topic and methodology received approval from the University of Montenegro.

Sample

The study population comprised former basic-school students now enrolled in the first grade of upper-secondary schools across Montenegro. Data were systematically collected from this population to gain a comprehensive understanding of the entire basic school curriculum they had experienced, ensuring that students' responses did not influence their educational trajectory. Collecting data from students in their first year of upper secondary school was practical, as their familiarity and opinions provide an overview of their experiences across various basic schools (Lang & Sorgo, 2024). This approach diversified the sample, reflecting the broader spectrum of schools attended by students in upper secondary classes. According to the statistical reports (Monstat, 2023), a total of 7,097 students were enrolled in the first grade of upper secondary education in 2022/23. school year, distributed across 53 upper secondary schools throughout Montenegro (see Eurydice 2023a; Eurydice 2023b). Because every student potentially had an equal chance to respond to the survey, approximately 400 respondents will guarantee a 95% confidence level with a 5% margin of error. In the present study, responses from 705 students were collected, with 634 students providing a full set of responses, allowing for the assumption of representativeness of the sample, albeit with well-known limitations associated with self-selection (Elston, 2021). Socio-demographic data were not collected to maintain focus on curriculum topics rather than student differences, ensuring complete anonymity.

Sampling

The data were recorded via an online survey platform (1KA.si). Data collection took place between 17 September and 17 November 2022. At the beginning of the process, emails were sent to all secondary schools in Montenegro, explaining the objectives of the study and requesting their support. It was emphasized that the data collected in this study will be used solely for academic purposes and possible future publications, which should provide insights that can contribute to improving learning outcomes and education for sustainable development. It was made clear that participation in the survey was both anonymous and voluntary and that students were free to withdraw their participation from the survey at any time.

To maximize data collection, two reminder letters were sent to schools asking them to encourage as many students as possible to participate in the survey. To avoid disrupting regular classes, it was suggested that teachers share the survey link with their students or conduct the survey during computer science class, where access to computers is easy. In this way, in theory, every student had the opportunity to participate in the survey. However, the survey has the limitation that the responses are collected from a population that is willing to participate, which can introduce a certain degree of bias.

Instrument and Procedures

The questionnaire was created to collect data for addressing research questions. To ensure the anonymity of students, no personal data or information about their background was requested. This approach is advantageous as it encourages more candid responses, while also preventing identification of schools and teachers, thereby

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facilitating potential improvements in current practices. The first part of the study aimed to assess familiarity with the content of the eight cross-curricular topics (CCTs) outlined in the Montenegrin ESD curriculum (refer to Table 1, Table 2). Students were asked, "How did you learn about the above topics related to sustainable development?" They were instructed to select the option that best reflected their level of exposure: (1) I heard about this topic for the first time in this questionnaire; (2) This topic was only mentioned in school but not explained; (3) This topic was only explained in detail in biology class; (4) This topic was explained in detail in several subjects; (5) I only heard about this topic in the media; (6) I informed myself about this topic independently of the available literature. The content validity of the response format was ensured through consultations with experts in the field. In Table 2, there are 27 themes included in the Education for Sustainable Development (ESD) curriculum for basic school. Students were asked: "How often have basic school teachers discussed the following topics in one or more subjects?" They were instructed to select a number corresponding to the frequency using a Likert scale (as used in previous studies, e.g., Lang & Šorgo, 2024). The scale offered six options: (1) Never; (2) Very rarely; (3) Rarely; (4) Sometimes; (5) Often; (6) Very often. Since the CCTs and themes in the first two tables were directly taken from a syllabus, their content validity stands unquestioned and was accepted without further scrutiny. In the case of the ESD contents (Table 2), all measures (e.g. Bartlett's test, KMO test) were performed as precursors to the factor analysis.

In the second part of the study (Table 3), the students were asked for their opinions on the ESD contents and practices in classes during basic school. The 7-point semantic differential scale with bipolar adjectives (Gardner, 1995) offers pairs of opposing statements and a number scale of 1-7 in between. A rating of 1 indicates complete agreement with a positive opinion towards ESD, while a rating of 7 indicates complete agreement with a negative opinion towards ESD contents. Close to 1 indicates stronger support or positive opinion towards ESD, while closer to 7 indicates stronger disagreement or negative opinion towards ESD content. Theoretically, the design of the scale comes from flow theory and was adopted from the study by Šorgo et al. (2018), but to ensure validity, the items (adjective pairs) were discussed with the experts in the field. The review of the data matrix shows that the Cronbach's alpha of the instrument is .964.

Data Analysis

In the first phase after data collection, each variable was analyzed for frequencies, missing data, central tendencies, dispersion, and normality distribution (Shapiro-Wilk test). Due to the categorical nature of variables presented in Table 1, only frequencies of responses are reported. The response format for the items in Table 2 is ordinal, hence the median was chosen among measures of central tendencies. Opinions were assessed using a scale based on bipolar adjective pairs. Since responses were provided on a scale from 1 to 7, it was assumed these numbers represent intervals on underlying latent variables. Therefore, mean and standard deviation are reported alongside median and mode.

As the instruments were not used in this form previously, an exploratory factor analysis (EFA) was conducted using principal axis factoring for factor extraction with direct oblimin rotation to assess the latent structure of responses. Parallel analysis was employed to determine the extracted factors. The reliability of the instruments and resulting factors from the EFA were evaluated using Cronbach's alpha coefficient, with a cutoff value of .7 set for proceeding with the analyses. Statistical analyses were performed using the open-source software Jamovi, version 2.3 (Jamovi, 2022)

Research Results

Students' Familiarity with the Cross-curricular Topics (CCTs) of the Basic School Curriculum of ESD

Students' familiarity with the eight cross-curricular topics (CCTs) of the basic school curriculum of ESD are presented in Table 1, through frequencies of the type of introduction during basic school.

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Table 1
Frequencies of the Type of Introduction to Cross-curricular Topics (CCTs) during Basic School

Code	CCTs	Familiarization*							
		1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	Sum 3+4	Sum 5+6
Q1c	Environmental protection	77 10.9	37 5.2	245 34.7	266 37.8	23 3.3	57 8.1	511 73.8	80 11.4
Q1e	Biodiversity	100 14.2	39 5.5	442 62.6	81 11.5	21 3	23 3.3	523 74.1	44 3.6
Q1f	Health education	103 14.6	86 12.2	72 10.2	295 41.8	56 7.9	94 13.3	367 52	150 21.2
Q1a	Climate change	118 16.7	76 10.8	131 18.6	263 27.3	60 8.5	58 8.2	394 45.9	118 16.7
Q1g	Human rights education	120 17	94 13.3	46 6.5	285 40.5	72 10.2	88 12.5	332 47	160 22.7
Q1d	Sustainable cities and settlements	173 24.5	147 20.8	69 9.8	198 28	77 10.9	42 5.9	267 37.8	119 16.8
Q1b	Green economy	286 40.5	117 16.6	154 21.8	61 8.6	61 8.6	27 3.8	215 30.4	88 12.4
Q1h	Entrepreneurial learning	299 42.4	158 22.4	26 3.7	109 15.4	59 8.4	55 7.8	135 19.1	114 16.5

Note. (CCTs) Cross-curricular topics; Familiarization*: (1) I heard about this topic for the first time in this questionnaire; (2) This topic was only mentioned in school but not explained; (3) This topic was only explained in detail in biology class; (4) This topic was explained in detail in several subjects; (5) I only heard about this topic in the media; (6) I informed myself about this topic independently of the available literature. The highest values (modes) are bolded.

When analyzing the data presented in Table 1, several important findings emerge. The most important finding is that all cross-curricular topics (CCTs) were absent for at least some of the students, with a range of about 11% for environmental protection and about 40% for Green economy and Entrepreneurship learning (column 1). On the other side of Table 1 (sum of columns 5 and 6), the frequencies in the last two columns, relating to media and literature, show the importance of structured educational approaches to ESD. In most cases, the 10% threshold for self-education and private initiative is not reached, and only in four cases is the percentage in the 10% to 15% range. The informing but not formative role of formal education is easily recognizable in column 2, where responses that the topics were only mentioned but not explained range from around 5% to 22%.

The aim for all CCTs to be covered across several subjects, promoting a comprehensive understanding of these topics and aligning with ESD curriculum guidelines, has not been fully achieved. Only three topics—Health Education, Human Rights, and Environmental Protection—reach a coverage level of approximately 40%. At the lower end of the scale, close to 10%, are the topics of Biodiversity and Green economy. The situation can be described as slightly better as topics closely linked to the general objectives of biology lessons (Q1c-Environmental protection, Q1e-Biodiversity) are mainly introduced within this specific subject. Despite the intention to treat all ESD topics in a cross-curricular way, students mainly encounter these topics within the biology curriculum. Familiarity with the topics can therefore be deduced from the summation of sums 3 (This topic was only explained in detail in biology lessons) and 4 (This topic was explained in detail in several subjects), which show that around three-quarters of students receive comprehensive information about Environmental protection and Biodiversity and only around one fifth about Entrepreneurial learning. It is evident that students are least familiar with the concepts of Entrepreneurial learning and Green economy during their basic school years, more so, about two-fifths of the respondents encountered these cross-curricular while completing the questionnaire for this research.

Inclusion of ESD Themes in the in Basic School Lessons

The results are presented as frequency and median values of inclusion of ESD themes in basic school lessons followed by factor loadings (Table 2).

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Table 2
Frequencies, Median Values and Factor Loadings of the Inclusion of ESD Themes in Basic School Lessons

Code	ESD themes	N	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	$\tilde{x}$	Factor 1	Factor 2
Q6aw	The importance of a healthy environment for human health	631	86 13.7	54 8.6	86 13.6	136 21.6	133 21.1	136 21.6	4	1.000	
Q6ak	How can each of us help preserve the environment?	630	91 14.4	47 7.5	77 12.2	117 18.6	168 26.7	130 20.6	4	.984	
Q6av	Consequences of improper nutrition and poor physical activity	631	95 15.1	53 8.4	90 14.3	135 21.4	133 21.1	125 19.8	4	.940	
Q6am	Significance, composition, and sources of air pollution	630	86 13.7	67 10.6	80 12.7	153 24.3	132 21	112 17.8	4	.891	
Q6au	Flora and fauna of National Parks, internationally protected habitats, and protected species in Montenegro	628	93 14.8	55 8.8	89 14.2	148 23.7	130 20.7	112 17.8	4	.888	
Q6ag	The problem with waste and the importance of recycling	629	95 15.1	58 9.2	77 12.2	150 23.8	136 21.6	113 18	4	.862	
Q6ap	Ways to reduce pollution from traffic	630	100 15.9	70 11.1	95 15.1	141 22.4	132 21	92 14.6	4	.851	
Q6ac	Consequences of climate change	629	83 13.2	58 9.2	71 11.3	154 24.5	166 26.4	97 15.4	4	.805	
Q6ab	Global warming, the greenhouse effect	630	86 13.7	62 9.8	87 13.8	169 26.8	148 23.5	78 12.4	4	.804	
Q6az	Respect for diversity	628	105 16.7	41 6.5	89 14.2	113 18	128 20.4	152 24.2	4	.762	
Q6ah	Types and importance of renewable energy sources	630	90 14.3	71 11.3	92 14.6	163 25.9	135 21.4	79 12.5	4	.759	
Q6aj	Ecological problems in Montenegro	631	106 16.8	50 7.9	82 13	132 20.9	165 26.1	96 15.2	4	.747	
Q6at	The consequences of the destruction of rivers, lakes, seas and coasts	627	90 14.4	57 9.1	110 17.5	130 20.7	135 21.5	105 16.7	4	.747	
Q6af	The importance of forests and their sustainable management	630	91 14.4	64 10.2	83 13.2	143 22.7	130 20.6	119 18.9	4	.744	
Q6an	Acid rains and their impact	630	111 17.6	65 10.3	103 16.3	165 26.2	98 15.6	88 14	4	.730	
Q6ar	The importance of land, its protection	630	94 14.9	63 10	92 14.6	168 26.7	124 19.7	89 14.1	4	.725	
Q6ax	Rights and obligations in the community	630	102 16.2	57 9	100 15.9	138 21.9	136 21.6	97 15.4	4	.707	
Q6ao	The importance of rational use of natural resources	630	105 16.7	83 13.2	117 18.6	163 25.9	87 13.8	75 11.9	4	.668	
Q6aq	Causes of biodiversity decline	630	118 18.7	62 9.8	106 16.7	169 26.8	106 16.8	70 11.1	4	.625	
Q6as	Ecological importance of mountain areas	631	103 16.3	71 11.3	103 16.3	156 24.7	112 17.7	86 13.6	4	.563	.327
Q6al	Sources of noise and its impact on human health	630	133 21.1	85 13.5	107 17	144 22.9	92 14.6	69 11	3	.397	.458
Q6ai	Advantages and disadvantages of fossil fuels	630	136 21.6	92 14.6	109 17.3	159 25.2	83 13.2	51 8.1	3	.365	.462
Q6ae	Sustainable agriculture	629	154 24.5	89 14.1	116 18.4	151 24	69 11	50 7.9	3		.757

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Code	ESD themes	N	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	$\tilde{x}$	Factor 1	Factor 2
Q6ad	'Green economy'	626	187 29.9	82 13.1	113 18.1	123 19.6	80 12.8	41 6.5	3		.737
Q6ba	European Union, advantages and disadvantages of Montenegro's entry into the European Union	630	200 31.7	72 11.4	85 13.5	130 20.6	71 11.3	72 11.4	3		.707
Q6aa	Sustainable development	631	174 27.6	102 16.2	124 19.7	122 19.3	72 11.4	37 5.9	3		.567
Q6ay	The difference between sex and gender	630	157 24.9	67 10.6	103 16.3	133 21.1	96 15.2	74 11.7	3		.537

Note. 1-Never; 2-Very rare; 3-Rarely; 4-Sometimes; 5-Often; 6-Very often; $\tilde{x}$-median; The highest values representing modes are bolded; 'Principal axis factoring' extraction method was used in combination with an 'oblimin' rotation.

When analyzing the frequencies of items shown in Table 2, it became clear that the themes intended for student education were absent in a range of about 13% to 30%, and only up to 20% of the themes were included very frequently. When analyzing the median values shown in Table 2, it became clear that the topics listed in the ESD curriculum for basic schools fall into the "sometimes" (20 cases) or "rarely" (7 cases) categories. However, there are instances (Q6aa, Q6ad, Q6ae, Q6ay, and Q6ba) where the mode value is 1 (indicating "never"), and only two cases (Q6aw, Q6az) have a mode 6 (very often).

A further analysis of the frequency of inclusion of ESD themes in lessons shows that Cronbach's alpha of the instrument is .981. By applying the EFA (Table 2), two highly correlated factors were extracted, which explained 68.9 % of the variance. The first factor (eigenvalue 14.37; 53.2 % of the explained variance) includes numerous topics that explain the impact of resource mismanagement in Montenegro and globally, as well as the importance of their sustainable use. The second factor (eigenvalue 4.25; 68.9% of the explained variance) includes the concept of sustainable development and the green economy, as well as the benefits of Montenegro's accession to the EU. The items Q6ai and Q6al are represented in both factors.

Opinions of the Basic School Leavers toward Greater Inclusion of ESD Content in Classes

The results of frequencies, measures of central tendencies, and exploratory factor analysis of opinions toward greater inclusion of ESD content in the teaching are provided in Table 3.

Table 3

Frequencies, Measures of Central Tendencies, and Factor Loadings of the Opinions toward ESD Contents and Practices in Classes

Code	Bipolar adjectives	N	1	2	3	4	5	6	7	$\tilde{x}$	s	Factor 1	Factor 2
Q5k	Important for human health-Unimportant for human health	639	138 21.6	66 10.3	82 12.8	112 17.5	54 8.5	50 7.8	137 21.4	3.50	2.19		.946
Q5j	Important for a healthy environment-Unimportant for a healthy environment	640	132 20.6	70 10.9	74 11.6	123 19.2	54 8.4	54 8.4	133 20.8	3.62	2.17		.917
Q5l	Important for survival on the Earth-Unimportant to survival on the Earth	638	140 21.9	66 10.3	68 10.7	115 18	70 11	41 6.4	138 21.6	3.62	2.19		.898
Q5g	Important for students-Unimportant for students	641	97 15.1	81 12.6	88 13.7	117 18.3	87 13.6	46 7.2	125 19.5	4.02	2.03	.624	
Q5e	Useful-Useless	646	86 13.3	61 9.4	99 15.3	152 23.5	97 15	49 7.6	102 15.8	4.03	1.9	.853	
Q5b	Necessary-Needlessly	641	73 11.4	65 10.1	116 18.1	140 21.8	96 15	47 7.3	104 16.2	4.09	1.88	.852	
Q5i	Important for the future generations-Unimportant for future generations	641	103 16.1	83 12.9	78 12.2	118 18.4	61 9.5	62 9.7	136 21.2	4.05	2.12	.378	.545

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Code	Bipolar adjectives	N	1	2	3	4	5	6	7	$\tilde{x}$	s	Factor 1	Factor 2
Q5f	Important for the whole society-Unimportant to society	642	106 16.5	64 10	74 11.5	137 21.3	76 11.8	54 8.4	131 20.4	4.09	2.07	.561	.355
Q5c	Interesting-boring	642	85 13.2	65 10.1	97 15.1	134 20.9	84 13.1	56 8.6	122 19	4.12	1.98	.906	
Q5e	Easy for students to master-Difficult for students to master	640	65 10.2	75 11.7	89 15.5	134 20.9	90 14.1	65 10.2	112 17.5	4.17	1.91	.861	
Q5h	Important to my further education-Unimportant to my further education	641	65 10.1	79 12.3	93 14.5	139 21.7	80 12.5	59 9.2	126 19.7	4.20	1.94	.728	
Q5d	Easy for teachers to realize-Difficult for teachers to realize	640	63 9.8	50 7.8	105 16.4	149 23.3	102 15.9	60 9.4	111 17.3	4.25	1.84	.757	

Note. All medians have value 4. The highest frequencies (modes) are bolded. The Table is sorted by increasing mean ($\bar{x}$). Semantic bipolar scale from 1 to 7; a rating of 1-complete agreement with a positive opinion towards ESD, while a rating of 7 indicates complete agreement with a negative opinion towards ESD. s-standard deviation. 'Principal axis factoring' extraction method was used in combination with an 'oblimin' rotation. Cronbach's alpha = .964

An analysis of the results in Table 3 reveals several findings. Analyzing the medians and means shows that all medians have a value of four, and the means range from 3.90 to 4.20, indicating a neutral position of the two measures for the central tendencies. A better insight can be gained by analyzing the frequencies of the responses. The distribution of frequencies shows that there are three items at the top of Table 3 whose mean values are slightly below the center point, and the number of those who hold extremely opposing opinions is almost equal (Q5k, Q5j, Q5l) with regard to the (un)importance of ESD for human health, a healthy environment, and survival on earth. At the lower end of the table are opinions where more students think that ESD is boring, difficult to master, unimportant for further education and that teachers have difficulties in implementing the ESD curriculum.

When further analyzing the significance of opinions towards ESD content and practices in the classroom by applying factorial analysis, two highly correlated factors were extracted, explaining 74.4% of the variance. The factor loadings are listed in Table 3. The first factor (eigenvalue 5.41; 45.1% of the explained variance) contains items about the interest, necessity and importance of ESD for students' future, with opinions being mostly neutral or negative. The second factor (eigenvalue 3.52; 29.3% of the explained variance) contains three items on the importance of ESD for survival on a global level and for the human health, with opinions divided into two extremes.

Discussion

At this point, the problem arises that the results of the present study cannot be directly compared with international studies, as the Montenegrin ESD curriculum is in some ways unique, even though the idea of ESD is integrated into many educational systems (e.g. Rauch, 2002). Another problem was that the references that show some similarity to the present study mostly report results from studies at the university level and very rarely at the basic or secondary school level (e.g. Šorgo & Kamenšek, 2012) and that even when the populations matched, the focus is different (e.g. Boeve-de Pauw et al., 2015). Not exactly helpful in categorizing the results is the diversity of school systems, where basic school years before diversification in different directions can be of any length, from 4 years (e.g. in the Czech Republic or Germany) to 9 years as in Slovenia or Montenegro (see Eurydice websites for details).

In seeking to answer the research question about familiarity and the channels through which students receive information about and are exposed to the curriculum topics, it is apparent that for all of the topics we surveyed, at least some students did not receive information about them during their basic school education. Additionally, only 5 of the 8 CCTs from the ESD curriculum were implemented in multiple subjects (28-41% of respondents), which is in line with the recommended approach (Van den Branden, 2012). From the perspective of these five topics (Environmental protection; Health education; Climate change; Human rights education; Sustainable cities and settlements), the results are optimistic. However, in three topics (Biodiversity; Green economy; Entrepreneurial learning), reasons and limitations that prevent cross-curricular implementation need to be identified. The highest familiarity is around three-quarters of the students for the topics of Environmental protection and Biodiversity, while the lowest is around one-fifth for Entrepreneurial learning. It is evident that students are the least familiar with the concepts of Entrepreneurial learning and the Green economy during their years in basic school. About

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two-fifths of the respondents encountered these topics for the first time in this questionnaire, which is a concerning finding. The interpretation of this result can be summarized with the statement by Silajdžić et al. (2015) that governmental and educational institutions fail to recognize their role and do not adequately support the development of green entrepreneurship.

When analyzing the results regarding the frequency of exposure to the detailed list of themes presented in Table 2, it became evident that the themes outlined in the ESD curriculum for basic schools predominantly fell into the categories of 'sometimes' or even 'rarely'. The most concerning finding is that for all of the themes listed, at least some students have never encountered the theme as part of the school curriculum. Combined with the finding from Table 1 that self-education cannot be relied upon (columns 5 and 6), the results are truly alarming. These findings underscore a significant gap between the intended curriculum and its actual implementation, a well-documented issue in the literature (e.g., Penuel et al., 2007). In Montenegro, certain ESD themes were consistently overlooked or inadequately addressed in basic education. The data clearly shows that the themes listed in the ESD curriculum for basic schools were only sporadically or rarely integrated into classroom practice. For example, regarding topics such as the European Union, the 'green economy', and sustainable development, almost a third of students stated that they had never encountered these topics during their basic school years. While these results cannot be directly compared with international findings due to contextual differences, they affirm the realization that simply including a topic in the curriculum does not guarantee its effective teaching to students (e.g., Šorgo & Kamenšek, 2012).

Nearly a decade has passed since the mandatory inclusion of these topics in all basic school subjects (Čabrilo et al., 2014), so one would expect a comprehensive coverage of these topics. However, based on the research design, it is not possible to definitively answer why certain curriculum topics are not included in daily lessons. It could be speculated that teachers may not have been sufficiently prepared or willing to teach this content, despite its mandatory status. Another assumption is that the overloaded compulsory curriculum in basic school subjects likely restricts teachers' ability to integrate cross-curricular content, including ESD (Kopnina, 2020). To address this issue, a careful revision of the compulsory curriculum is suggested to reduce teachers' workload. Alongside this, implementing mandatory retraining programs for teachers across all subjects could better equip them to integrate topics like ESD effectively. By creating a more balanced curriculum and providing ongoing professional development, teachers would have the time, skills, and flexibility needed to promote a more holistic and sustainable approach to education.

Understanding students' opinions on content delivery practices is crucial for predicting future behaviors. However, an analysis of students' opinions reveals a concerning trend: many perceive ESD similar to the documented findings for subjects like biology, which is emphasized as dull, lifeless, and boring (Tranter, 2004). This perception suggests that the issue lies not in the importance of the topics themselves but rather in how they are presented in schools (Kletečki et al., 2023). At this pivotal stage in their education, students ideally should have acquired foundational knowledge, developed sustainable habits, and cultivated awareness about their well-being and the planet's future. Yet, their somewhat ambivalent attitudes toward the balanced integration of economic, social and environmental development are less than ideal. While some students express positivity, there is a notable lack of a clear and resolute stance among young people on the importance of sustainability, considering their future roles as academics, engineers, doctors, and parents. This clearly indicates that the current ESD curriculum in basic school has not yielded the anticipated results. This is evident from students' inability to articulate a more positive and informed perspective on sustainable thinking and action. This critical mismatch underscores a significant gap between the intended impact of the ESD curriculum and students' actual perceptions. These findings underscore the urgent need to enhance students' awareness of ESD's significance, not only for personal growth but also for global well-being. Specifically, there is a compelling argument to intensify ESD content in upper secondary schools, given the less-than-encouraging outcomes observed in basic schools. To effectively bridge this gap, it is essential to conduct a thorough reevaluation of the curriculum's implementation strategy. This reassessment should focus on making necessary adjustments aimed at achieving the desired outcomes of enhancing sustainability awareness and cultivating a proactive mindset among students.

Conclusions and Implications

The study analyses familiarity with and opinions toward ESD of Montenegrin first-grade upper secondary school students (fifteen-year-olds). The results indicate that students are insufficiently familiar with the content of the ESD curriculum, although it has been mandatory in nine-year basic school since 2014. The data strongly suggest that the themes listed in the curriculum framework for ESD in basic school are only sporadically or rarely

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integrated into teaching practice. Furthermore, the fundamental objective of integrating all topics from the ESD program should be implemented cross-curricularly, has not been achieved. Additionally, fifteen-year-olds mostly showed a neutral opinion toward the themes of the curriculum and its implementation practices. They did not demonstrate a clear majority opinion toward embracing sustainable thinking and behavior. Overall, the results emphasize the discrepancy between the planned curriculum and its actual implementation.

These results make it clear that the introduction of a curriculum is no guarantee that teachers will incorporate it appropriately into their lesson plans. To ensure the effective implementation of the ESD goals outlined in the curriculum, it is crucial to develop and improve the comprehensive training of teachers of all subjects in basic school in Montenegro and develop effective assessment tools to measure students' knowledge and application of ESD concepts. Also, a careful revision of the compulsory curriculum to alleviate teachers' workload. In addition, it is important to create the conditions for smooth implementation, including the provision of teaching materials and appropriate literature for the implementation of ESD content for each subject, which would have detailed methodological instructions for implementation. Such measures would lay the foundation for a more successful implementation of ESD and raise students' awareness of the central role of sustainable development for humanity.

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Declaration of Interest

The authors declare no competing interest.

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Biografija Snežane Lješnjak

Rođena sam 24. aprila 1986. godine u Podgorici. Nakon što sam završila osnovnu školu „Maksim Gorki" i srednju Medicinsku školu, 2004. sam upisala sam Prirodno-matematički fakultet u Podgorici, Odsijek za biologiju. Završila sam trogodišnji biološki program 2007. godine sa prosečnom ocenom 9,2, stekavši zvanje Bachelor biologije. Godine 2008. završila sam specijalističke studije sa prosječnom ocjenom 9,95 i stekla zvanje Specijalista biologije.

U akademskoj godini 2008/2009. započela sam master studije na Prirodno-matematičkom fakultetu Univerziteta Crne Gore, usavršavajući se u oblasti ekologije i zaštite životne sredine. Nakon položenih ispita sa prosječnom ocjenom 10, u maju 2009. odbranila sam master rad pod naslovom „Ekološka edukacija u nastavi Prirode u drugom ciklusu devetogodišnje osnovne škole" čime stičem zvanje magistra Ekologije i zaštite životne sredine.

Tokom studija, bila sam dobitik stipendije od Opštine Nikšić i Ministarstva prosvjete Crne Gore. Od 2011. godine radim kao nastavnik biologije u osnovnoj školi i povremeno sam angažovana na brojnim državnim projektima vezanim za obrazovanje.

Majka sam Maše i Iskre.

Objavljeni radovi:

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O D L U K U
O IZBORU U ZVANJE

Dr Anđelka Šćepanović bira se u akademsko zvanje vanredni profesor Univerziteta Crne Gore za **oblasti Opšta grupa bioloških predmeta i Ekologija,** na Prirodno-matematičkom fakultetu i nematičnim fakultetima Univerziteta Crne Gore, na period od pet godina.

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PREDSJEDNIK

Prof. dr Danilo Nikolić, rektor

BIOGRAFIJA

Rođena sam 17.02.1973.godine u Podgorici, gdje sam završila Osnovnu školu "Sutjeska" i Gimnaziju "Slobodan Škerović".

Diplomirala sam na Odsjeku za biologiju Prirodno-matematičkog fakulteta u Podgorici 1996.godine.

Magistrirala sam na Biološkom fakultetu u Beogradu, smjer Genetika, 2001.godine, na temu "Populaciono-genetičke analize antropometrijskih i morfofizioloških karakteristika kod ispitanika različitog uzrasta stanovnika Pljevalja i Kotora", pod mentorstvom akademika SANU prof.dr Dragoslava Marinkovića i akademika CANU prof.dr Božine Ivanovića.

2013.godine na Univerzitetu Crne Gore stekla sam zvanje doktora bioloških nauka (oblast Humana biologija), odbranom doktorske teze "Antropometrijske karakteristike pacijenata sa dijagnozom Asthma bronchiale", pod mentorstvom prof. Verice Bozic-Krstic sa Prirodno-matematickog fakulteta Univerziteta u Novom Sadu.

Na poziv akademika Ruske akademije nauka Tatjane A. Ivanovič u dva navrata sam boravila na stručnom usavršavanju na Moskovskom državnom univerzitetu "Lomonosov" i Institutu za antropologiju i ekologiju Ruske akademije nauka.

Od 1994. godine aktivno učestvujem na Kongresima Antropološkog društva bivše Jugoslavije, a od 2007.godine član sam i Antropološkog društva Srbije.

Od 2010 - do danas, autor sam i ocjenjivač testova na takmičenju „Olimpijada znanja" iz oblasti biologije, u organizaciji Prirodno-matematičkog fakulteta.

Od strane Zavoda za udzbenike Crne Gore više puta sam bila angažovana kao recenzent za udzbenike i priručnike iz biologije.

Takodje, kao jedini fizički antropolog u Crnoj Gori koji se bavi analizom antropometrijskih i epigenetičkih parametara na paleoosteološkom materijalu, angažovana sam na gotovo svim arheološkim projektima u Crnoj Gori koji iziskuju takve analize.

Predmet mog užeg naučnog interesovanja je proučavanje bioloških svojstava čovjeka. Istraživanja kojima se bavim posvećena su prije svega problemima rasta i razvoja djece i odraslih, procjena njihovog morfološkog statusa i fizičkog stanja u standardnim ili specifičnim uslovima, s ciljem proučavanja interakcijskih procesa i uticaja genetičkih faktora s jedne i mnogobrojnih ekoloških, socioloških, medicinskih i drugih faktora spoljašnje sredine, sa druge strane.

PODACI O RADNIM MJESTIMA I IZBORIMA U ZVANJA

Od 1996.godine zaposlena sam na Odsjeku za biologiju Prirodno-matematičkog fakulteta u Podgorici.

U početku kao asistent, a kasnije saradnik u nastavi, bila sam angažovana na izvođenju vježbi iz Antropologije, Humane ekologije, Razvoja djeteta, Uporedne fiziologije, Opšte fiziologije, Kursa laboratorijskih tehnika i Genotoksikologije na studijskoj grupi za biologiju PMF-a, kao i Humane genetike na Medicinskom i Stomatološkom fakultetu i Biologije sa humanom genetikom na Farmaceutskom fakultetu.

Odlukom Senata Univerziteta Crne Gore za školsku 2013/2014. godinu, a nakon stečenog akademskog zvanja doktora bioloških nauka, dodijeljena su mi, pored vježbi, i predavanja iz Antropologije na Prirodno- matematičkom fakultetu.

26.02.2015.godine izabrana sam u zvanje docenta na predmetima **Antropologija** i **Ekologija populacija** na Prirodno-matematičkom fakultetu, Studijski program biologija i na predmetu **Biologija sa humanom genetikom** na Medicinskom fakultetu, studijski program Farmacija, sa punim fondom časova.

Takodje, u okviru specijalističkih studija Eksperimentalna biologija i biotehnologija na Studijskom programu biologija, od početka tog programa izvodim nastavu na predmetu **Genetika i tehnike u dijagnosticiranju**, kao i vježbe na predmetu **Kurs laboratorijskih tehnika**.

U toku je i realizacija prijavljene magistarske teze iz oblasti Genetika, gdje sam mentor, a čiji je eksperimentalni dio realizovan u Laboratoriji za genetička ispitivanja-struktura i dinamika hromozoma, pri Evropskoj laboratoriji za molekularnu biologiju (EMBL) u Hajdelbergu, Njemačka.

Odlukom Senata Univerziteta Crne Gore, prvo od 2018.godine, a zatim i u novom sazivu, Odlukom od 1.09.2019.godine, imenovana sam za člana Uredjivačkog odbora, na mjesto urednika za oblast prirodnih i tehničkih nauka.

Odlukom Vijeća Prirodno-matematičkog fakulteta od 10.09.2019 imenovana sam za predsjednika uredjivačke komisije na istom.

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3. **Scepanovic A.,** Krivokapic S., Scepanovic V., Zivkovic V., Perovic S. (2019). Chemical constituents and biological potential of essential oils of *Helichrysum italicum* (Roth) G.Don from Montenegro. Agriculture&Forestry. Vol.65, Issue 2, pp.53-58. ISSN/eISSN 0554-5579/1800-9492. doi: 10.17707/AgricultForest.65.2.04 (SCOPUS)
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O D L U K U
O IZBORU U ZVANJE

Dr **DANKA CAKOVIĆ** bira se u akademsko zvanje **redovni profesor Univerziteta Crne Gore** iz oblasti **Ekologija na Prirodno-matematičkom fakultetu Univerziteta Crne Gore**, na neodređeno vrijeme.

SENAT UNIVERZITETA CRNE GORE
PREDSJEDNIK

Prof. dr Vladimir Božović, rektor

DANKA CAKOVIĆ BIOGRAFIJA I BIBLIOGRAFIJA

Biografija

Rodena sam 28.08.1977. godine u Titogradu, gdje sam završila osnovnu školu i gimnaziju. Školske 1996/97 godine upisala sam studije Biologije na Prirodno-matematičkom fakultetu u Podgorici. Diplomirala sam oktobra 2000. godine sa prosječnom ocjenom 9.48 i stekla zvanje diplomirani biolog. Dobitnica sam plakete Univerziteta Crne Gore za najboljeg studenta u oblasti prirodnih nauka, za školsku 1999/2000. godinu. Poslijediplomske studije, smjer Ekologija i geografija biljaka upisala sam školske 2000/01. godine na Biološkom fakultetu Univerziteta u Beogradu. Magistarsku tezu pod nazivom: "Floristička studija planine Sutorman" odbranila sam u februaru 2004. godine i stekla zvanje magistra bioloških nauka. Zvanje doktora bioloških nauka stekla sam na Prirodno-matematičkom fakultetu (Studijski program Biologija) Univerziteta Crne Gore, odbranom doktorske teze "Floristička i vegetacijska studija planinskog masiva Rumije" 17.10.2011.

Od 2021. sam zaposlena na Univerzitetu Crne Gore, PMF, Studijski program Biologija. Izvodim nastavu. Od 2001. do 2012. Sam bila saradnik u nastavi na studijskom programu Biologija. U navedenom periodu bila sam angažovana na izvođenju nastave iz sledećih predmeta: Ekologija biljaka, Anatomija i morfologija biljaka, Sistematika i filogenija viših biljaka, Opšta fiziologija. 2005 do 2012. saradnik u nastavi na Poljoprivrednom fakultetu, Studijski program Biljna proizvodnja, predmeti: Botanika i Fiziologija biljaka 2007. do 2012. saradnik u nastavi na Farmaceutskom fakultetu, predmet Botanika. Zvanje docenta na Prirodnomatematičkom fakultetu (predmeti: Ekologija biljaka I, Ekologija biljaka II, Ekofiziologija na Studijskom programu Biologija i Botanika na Studijskom programu Farmacija) stekla sam 01.06.2012. godine. Od izbora u zvanje docenta nastavila sam da držim vježbe na predmetima Ekologija biljaka I i Ekologija biljaka II, a od školske 2014/2015. godine držim predavanja na predmetu Metodika nastave biologije. U oktobru 2017. izabrana sam u zvanje vanrednog profesora na predmete Ekologija biljaka, Ekologija vegetacije i Ekofiziologija (botanički dio) na Prirodnomatematičkom fakultetu (Studijski program Biologija) i Botanika na Medicinskom fakultetu. U septembru 2022.godine sam izabrana u redovnog profesora. U period 2017.-2023. Godina bila sam rukovodilac Studijskog programa Biologija.

Do sada sam bila rukovodilac četiri bilateralna projekta sa Austrijom, kao i učesnik u više naučnih i stručnih međunarodnih i nacionalnih projekata. Na različite načine sam uključena u osnovnoškolsko i srednješkolsko obrazovanje iz oblasti prirode i biologije u Crnoj Gori: od 2007. godine sam recezent Zavoda za udžbenike Crne Gore, bila sam predsjednik komisija za pisanje programa iz Prirode i Biologije za osnovne škole i biologije za gimnaziju, autor sam 8 udžbenika za osnovnu školu, član sam komisije za takmičenje Olimpijada znanja koje organizuje PMF, od 2019. godine sam član Odbora za obrazovanje i pedagogiju Crnogorske Akademije nauka o umjetnosti. Učestvujem u radu »IUCN SSC Freshwater Plant Specialist Group" Bila

sam član Naučnog odbora Crnogorske postavke na 16. Bijenalu arhitekture u Veneciji i član naučnog odbora Sednog Balkanskog botaničkog kongresa.
Posjedujem aktivno znanje engleskog jezika.

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Univerza v Mariboru

Slomškov trg 15
2000 Maribor, Slovenija

Skladno z določilom 2. odstavka 56. člena Zakona o visokem šolstvu (ZVIS-UPB7, Uradni list RS, št. 32/2012, s sprem. in dopol. do 75/2016), določilom 18. alineje 253. člena Statuta Univerze v Mariboru (Statut UM-UPB12, Uradni list RS, št. 29/2017), določili Meril za volitve v nazive visokošolskih učiteljev in visokošolskih sodelavcev (Obvestila UM štev. XXX-5-2012, sprem. in dopol. do XXXV-5-2017), na vlogo in priloženo dokumentacijo izr. prof. dr. Andreja Šorga ter predlog Habilitacijske komisije z dne 14.03.2018, izdaja Senat Univerze v Mariboru na podlagi sklepa 31. redne seje Senata Univerze v Mariboru z dne 27.03.2018 naslednjo

ODLOČBO

Senat Univerze v Mariboru izvoli **izr. prof. dr. Andreja ŠORGA**, rojenega 28.01.1957 v Mariboru, v naziv **redni profesor** za predmetno področje "didaktika biologije" za **neomejeno dobo.** Izvolitvena doba traja od 27.03.2018 naprej.

Obrazložitev:

Senat Univerze v Mariboru je na 31. redni seji, dne 27.03.2018, obravnaval vlogo izr. prof. dr. Andreja Šorga za izvolitev v naziv redni profesor za predmetno področje "didaktika biologije".
Na osnovi vloge in priložene dokumentacije, ocen strokovnih poročevalcev ter pozitivnega mnenja študentov, je Senat Univerze v Mariboru ugotovil, da kandidat izpolnjuje predpisane pogoje sprejetih Meril za volitve v nazive visokošolskih učiteljev in visokošolskih sodelavcev (Obvestila UM štev. XXX-5-2012, sprem. in dopol. do XXXV-5-2017) za izvolitev v naziv redni profesor. Zato je na predlog Habilitacijske komisije z dne 14.03.2018 s tajnim glasovanjem odločil, kot je navedeno v izreku. Iz navedenih razlogov je odločitev v izreku te odločbe dejansko in pravno utemeljena.

POUK O PRAVNEM SREDSTVU: Zoper dokončno odločbo ni možna pritožba. Prediagatelj lahko zoper dokončno odločbo sproži upravni spor v roku 30 dni od prejema pisnega odpravka te odločbe pri Upravnem sodišču Republike Slovenije, Oddelek v Mariboru, Ulica škofa Maksimilijana Držečnika 6, 2000 Maribor.

Senat Univerze v Mariboru
Številka: 711-7024/2018/9/530-MK
Datum: 03.04.2018

Predsednik Senata Univerze v Mariboru
Prorektor Univerze v Mariboru

prof. dr. Žan Jan Oplotnik

ODLOČBO VROČITI:
- red. prof. dr. Andrej Šorgo, Ptujska cesta 91, 2327 Rače (s povratnico)
- Dekan FNM (s povratnico)
- Arhiv, tu

Andrej Šorgo

University of Maribor

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Dr. Andrej Šorgo (male) is a full professor of biology didactics and former chair of Department of Biology at the Faculty of Natural Sciences and Mathematics, University of Maribor. He got his PhD degree in Biology from the University of Ljubljana. He has over 20 years of experience as a secondary school teacher and lecturer at higher vocational school. Recently is a university teacher of Biology didactics and several related subjects in the field of Biology and Environmental education. As a part-time researcher, he is an employee of the Faculty of Computer sciences and Electrical Engineering of UM and visiting professor at the Charles University in Prague. He has diverse interests in research on science and environmental education, and public acceptance of technologies as socio-scientific issues. He has published a series of research and professional articles in these fields and has reported findings at a number of conferences. He was a co-worker in a number of educational projects, both at the national and international level (Leonardo). He was Slovenian representative in the executive board of International Alpen Adria College and leader of one of its international summer schools, with no tolerance to any kind of discrimination. Additionally, he was one of the co-authors for the Slovenian curriculum for Environmental education. As a university professor, he was the leader of the Biological track of the EU project "Development of Science competences". At the moment he has just finished a leadership of the project T "Development, testing and validation of an autonomous intelligent and adaptive e-learning system for the improvement of information literacy of adolescents", grant no. J5-8230. He was qlso a research partner in a project "Development of information literacy of university students as a support for solving authentical science problems". Currently, he is a member of the" Information systems" research group. He was awarded as the most innovative Slovenian high school teacher for the year 2004.

His bibliography (full record is available at the https://bib.cobiss.net/bibliographies/si/webBiblio/bib201_20220711_193955_a3955299.html) counts more than 700 bibliographical units, among them 107 original scientific articles, 5 review articles, and 23 book chapters. He is also author of textbooks, and numerous contributions to the conferences.

He is also menthor of three finished doctorates.

A list of 6 relevant publications related to the intended outcomes of the co-mentorship where AŠ was first or leading author:

ŠORGO, Andrej, DOJER, Brina, GOLOB, Nika, REPNIK, Robert, REPOLUSK, Samo, PESEK, Igor, PLOJ VIRTIČ, Mateja, ŠPERNJAK, Andreja, ŠPUR, Natalija. Opinions about STEM content and classroom experiences as predictors of upper secondary school students' career aspirations to become

researchers or teachers. *Journal of research in science teaching*, ISSN 0022-4308, Dec. 2018, vol. 55, iss. 10, str. 1448-1468, ilustr., doi: 10.1002/tea.21462. [COBISS.SI-ID 23839240]
financer: ARRS, Programi, P2-0057 (B), SI, Informacijski sistemi

ŠORGO, Andrej, ŠILING, Rebeka. Fragmented knowledge and missing connections between knowledge from different hierarchical organisational levels of reproduction among adolescents and young adults. *CEPS journal : Center for Educational Policy Studies Journal*. 2017, vol. 7, no. 1, str. 69-91, tabele. ISSN 1855-9719. http://www.cepsj.si/pdfs/cepsj_7_1/pp_69-91.pdf. [COBISS.SI-ID 11496009], [SNIP, Scopus do 14. 2. 2022: št. citatov (TC): 2, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 1,00]

ŠORGO, Andrej, PIPENBAHER, Nataša, ŠIMIĆ ŠAŠIĆ, Slavica, PROKOP, Pavol, KUBIATKO, Milan, GOLOB, Nika, ERDOGAN, Mehmet, TOMAŽIČ, Iztok, BILÉK, Martin, FANČOVIČOVA, Jana, LAMANAUSKAS, Vincentas, USAK, Muhammet. Cross national study on pre-service elementary and science teachers' opinions on science teaching. *Eurasia journal of mathematics, science and technology education*. 2015, vol. 11, iss. 4, str. 713-723. ISSN 1305-8223. http://www.ejmste.com/ms.aspx?kimlik=10.12973/eurasia.2015.1379a, DOI: 10.12973/eurasia.2015.1379a. [COBISS.SI-ID 3529295], [JCR, SNIP, WoS, Scopus do 7. 4. 2022: št. citatov (TC): 3, čistih citatov (CI): 2, čistih citatov na avtorja (CIAu): 0,19]

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Broj: 2024/01-1405
Datum: 29.05.2024

Na osnovu člana 64 Statuta Univerziteta Crne Gore, kao i člana 7 stav 5 Pravila postupka izbora u akademska zvanja, Vijeće Prirodno-matematičkog fakulteta u Podgorici, na CXV sjednici održanoj 28.05.2024. godine, donijelo je

O D L U K U

1. **Usvajaju se** Referati i predlozi recezenata za izbor u akademsko zvanje za oblast Ekologija i Molekularna biologija, genetika i evolucija na Prirodno-matematičkom Univerziteta Crne Gore.

2. **Utvrđuje se** Predlog odluke da se prof. dr Danilo Mrdak izabere u akademsko zvanje redovni profesor za oblast oblast Ekologija i Molekularna biologija, genetika i evolucija na Prirodno-matematičkom fakultetu Univerziteta Crne Gore.

D e k a n
Prof. dr Miljan Bigović

Na osnovu člana 88 stav 8 Statuta Univerziteta Crne Gore, Naučni odbor je na sjednici 10.06.2024. godine formirao

KONAČNO MIŠLJENJE

o ispunjenosti uslova i kriterijuma za izbor u akademsko zvanje

kandidata dr Danila Mrdaka

Dr Danilo Mrdak koautor je više radova u časopisima kategorija Q1-Q4 (radovi objavljeni u časopisima koji se nalaze u međunarodnim bazama podataka SCI/SCIE/SSCI/AHCI).

U kategorijama Q1-Q4 kandidat ima zahtijevanih 16 poena, čime su zadovoljeni kriterijumi shodno aktu Uslovi i kriterijumi za izbor u akademska zvanja.

Mišljenje Naučnog odbora je da dr Danilo Mrdak **ispunjava uslove** za izbor u zvanje **redovni profesor**.

Broj: 018-15/2
Podgorica, 10.06.2024 godine

ZA NAUČNI ODBOR
PREDSJEDNIK

Prof. dr Irena Orović

BIOGRAFIJA I BIBLIOGRAFIJA DANILO MRDAK

Rođen sam 01.07.1976. godine u tadašnjem Titogradu (Podgorica), gdje sam završio osnovnu (»Sutjestka«) i srednju školu (gimnazija »Slobodan Škerović«).

Školske 1995/96 godine upisao sam studije Biologije (Opšta Biologija, 9 semestara) na Biološkom fakultetu, Univerziteta u Beogradu gdje sam u septembru 2000. Godin diplomirao sa diplomskim radom „Ekološko upoređivanje zajednica riba u Sutomoru i u Ljutoj" sa prosječnom ocjenom studiranja 9,27 i tako steako zvanje diplomiranog biologa.

Poslijediplomske studije upisao sam školske 2000/2001. godine na Biološkom fakultetu Univerziteta u Beogradu (smjer: Biologija izabranog taksona – *pisces*, 6 semestara) i 2003. godine završio ih sa prosječnom ocjenom 10. Magistarsku tezu pod nazivom: "*Taksonomska i ekološka karakterizacija ihtiofaune infralitorala južnog Jadrana*" odbranio sam 15. 12. 2003. godine i stekao zvanje magistra bioloških nauka.

Doktorsku disertaciju pod nazivom: "Pastrmke (*Salmo* L., 1758) rijeka Crne Gore – diverzitet, taksonomski status i filogenetski odnosi ", odbranio sam 01. 07. 2011. godine, na Biološkom fakultetu Univerziteta u Beogradu i stekao zvanje doktora bioloških nauka. Rješenje o priznavanju Uvjerenja o stečenom naučnom stepenu Doktora bioloških nauka izdato mi je od strane Ministarstvo prosvjete i sporta, Vlade Crne Gore, 14. septembra 2011. godine.

Studisjki boravci

Jun 2004 – Biotehnički fakultet, Laboratorija za Genetiku, Univerztet u Ljubljani
April - Maj 2005 – Biotehnički fakultet, Laboratorija za Genetiku, Univerztet u Ljubljani
Novembar 2005 – Biotehnički fakultet, Laboratorija za Genetiku, Univerztet u Ljubljani
Jun- Jul 2006 – Hellenic Insititute for Marine Research
Novembar 2006 - Hellenic Institute for Marine Research
April 2008 – Institute of Zoology, Karl – Franzens University of Graz
Oktober 2009 - Institute of Zoology, Karl – Franzens University of Graz
April 2016 – Institute for fishery – Potsdam, Germany

Podaci o radnim mjestima i izborima u zvanja

- Od okotbra 2000. godine zasnovao sam radni odnos na Prirodno-matematičkom fakultetu u Podgorici (Studijski program Biologija), gdje sam marta 2001. godine izabran u zvanje saradnika u nastavi. U toku svog desetogodišnjeg staža asistirao sam u laboratorijskim vježbama i izvodio praktičnu nastavu na predmetima. *Biologija Mora, Ekologija životinja, Zoologija Invertebrata, Ekologija životinja I i II, Sistematika algi, gljiva i lišajeva, Krenobiologija, Ekologija populacija* i *Biocenologija* a sve na akademskom i specijalističkom studijeskom programu Biologija.
- U vremenskom intervalu 2006 – 2009 bio sam predstavnik saradnika u nastavi u sazivu Senata Univerziteta Crne Gore.
- 2012 godine u julu biram sa u zvanje Docneta za predmete: Konzervaciona biologija, Genetika populacija i Principi održivog razvoja

- 2013 – 2016 obavljao sam dužnost prodekana za međunarodnu saradnju i nauku na Prirodno-matematičkom fakultetu
- 2016 obavljao sam dužnost VD rukovodioca Studijskog Programa Biologija na Prirodno-matematičkom fakultetu
- Od 2014 godine držim nastavu iz predmeta Osnovi prirodnih nauka I (Biologija sa ekologijom na studijskom programu Obrazovanje učitelja – Filozofski fakultet kao i predmet Osnovi humane genetike na studijskom programu Psihologija – Filozofski fakultet.
- 2015-2016 obavljao sam dužnost V.D. rukovodioca studijskog programa Biologija na Prirodno-matematičkom fakultetu.
- 2018 godine biram se u zvanje Venrednog profesora za predmete: Konzervaciona biologija, Genetika populacija i Principi održivog razvoja

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Univerzitet Crne Gore
University of Montenegro

Broj / Ref 03 - 4942
Datum / Date 16. 11. 2020

Na osnovu člana 72 stav 2 Zakona o visokom obrazovanju („Službeni list Crne Gore" br 44/14, 47/15, 40/16, 42/17, 71/17, 55/18, 3/19, 17/19, 47/19, 72/19 i 74/20) i člana 32 stav 1 tačka 9 Statuta Univerziteta Crne Gore, Senat Univerziteta Crne Gore na sjednici održanoj 16.11.2020. godine, donio je

O D L U K U
O IZBORU U ZVANJE

Dr Dijana Vučković bira se u akademsko zvanje vanredni profesor Univerziteta Crne Gore za **oblast Metodika razredne i razredno-predmetne nastave crnogorskog-srpskog, bosanskog, hrvatskog jezika i književnosti i Metodika vaspitno-obrazovnog rada,** na Filozofskom fakultetu Univerziteta Crne Gore, na period od pet godina.

SENAT UNIVERZITETA CRNE GORE
PREDSJEDNIK

Prof. dr Danilo Nikolić, rektor

Biografija sa bibliografijom

dr Dijana Vučković, vanredni profesor Univerziteta Crne Gore

Biografija

Rođena u Bileći (Bosna i Hercegovina, SFRJ), gdje je završila osnovnu i srednju školu. Diplomirala na Filozofskom fakultetu u Nikšiću (prosječna ocjena 9,31, Studijski program za obrazovanje učitelja), magistrirala 2005. godine (prosjek 9,87) i doktorirala 2009. godine na Univerziteta u Beogradu. Doktor je didaktičko-metodičkih nauka i vanredni profesor Univerziteta Crne Gore.

Diplomski rad, magistarsku tezu i doktorsku disertaciju Vučković je radila iz metodike nastave srpskog jezika i književnosti. Izabrana je u zvanje vanredni profesor za oblast metodike nastave crnogorskog-srpskog, bosanskog, hrvatskog jezika i književnosti na Studijskom programu za obrazovanje učitelja i oblast metodika vaspitno-obrazovnog rada na Studijskom programu za predškolsko vaspitanje. Vučković izvodi nastavu iz predmeta Opšta metodika razredno-predmetne nastave (SP Pedagogija), Metodika nastave čitanja i pisanja (SP Psihologija) i Recepcija književnih i filmskih likova sa posebnim potrebama (SP Inkluzivno obrazovanje).

Radni angažman

Nakon završetka studija na Filozofskom fakultetu u Nikšiću, Vučković je pet godina radila u OŠ "Dušan Đukanović". Studijske 2003/04. godine angažovana je od strane Filozofskog fakulteta kao honorarni saradnik u nastavi za predmet Metodika nastave srpskog jezika i književnosti na Studijskom programu za obrazovanje učitelja. Radni odnos na Filozofskom fakultetu zasnovala je 1. novembra 2005. godine u svojstvu saradnika u nastavi za predmet Metodika nastave srpskog jezika i književnosti na Studijskom programu za obrazovanje učitelja. U zvanje vanredni profesor na Filozofskom fakultetu izabrana je novembra 2020. godine.

U periodu 2008–2020. bila je rukovodilac je Studijskog programa za obrazovanje učitelja na Filozofskom fakultetu u Nikšiću, a od 2020. obavlja poslove prodekana za nastavu na Filozofskom fakultetu. Vučković je bila članica Vijeća društvenih nauka Univerziteta Crne Gore u periodu 2014–2018. godine i Centra za studije i kontrolu kvaliteta i Odbora za monitoring magistarskih studija Univerziteta Crne Gore u periodu 2017–2022. godine. Članica je Upravnog odbora Univerziteta Crne Gore od 2021. godine.

Stručna djelatnost

Vučković je učestvovala u više međunarodnih projekata. Između ostalog, riječ je o projektima Savjeta Evrope: *Travel Pass to Democracy* (2013), *Teaching Controversial Issues* (2015), *Fostering a Democratic School Culture in Montenegro* (2018). Aktivno je učestvovala i u nacionalnim i bilateralnim projektima poput: *Demokratija i obrazovanje* (Civitas Montenegro centar), *Liderstvo i omladinski rad u zajednici* (Filozofski fakultet i Forum MNE, Univerzitet u Jonkopingu, Švedska), *Nasilje među vršnjacima* (Civitas Montenegro centar), *Vaspitanje tolerantne ličnosti* (UNESCO katedra na Filozofskom fakultetu), *Preduzetničko učenje na neekonomskim fakultetima* (SEECEL, Zagreb). Bila je članica užeg tima Univerziteta Crne Gore za rad na projektu TEMPUS DEVCORE

(*Development of Learning Outcomes Approach – Way to a Better Comparability, Recognition, and Employability at the Labour Market, capacity building project*), a od novembra 2017. godine bila je angažovana u radu na ERASMUS+ Re@WBC projektu (*Enhancement of HE Research Potential Contributing to Further Growth of the WB Region*). Članica je međunarodne organizacije *Athens Institute for Education and Research (ATINER)*.

Sertifikovani je Montesori pedagog od 2016. godine. Autor je i realizator nekoliko programa stručnog usavršavanja nastavnika. Recenzent je u Zavodu za udžbenike Crne Gore i koautor udžbeničkog kompleta za književnost za drugi razred osnovne škole. Koautor je Brajevog bukvara (2016) i član redakcije časopisa *Naša škola i Uzdanica*.

Naučno-istraživački rad

Prof. dr Dijana Vučković učestvovala je u radu brojnih međunarodnih naučnih i stručnih konferencija i skupova. Teme kojima se bavi aktuelne su na regionalnom i širem planu. Neki od radova urađeni su kvalitativnom metodologijom, a realizovala je i opsežna kvantitativna istraživanja. U naučnoistraživačkom radu Vučković koristi raznovrsne metode, tehnike i instrumente prikupljanja i obrade podataka.

Izbor iz bibliografije
Radovi u časopisima indeksiranim u A&HCI i SSCI:

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3. Vučković, D., Bratić, V. (2020). Propp Revisited: A Structural Analysis of Vuk Karadžić's Collection Serbian Folk Fairy Tales. Zeitschrift für Slawistik 65(3): 1–33. https://doi.org/10.1515/slaw-2020-0017
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6. Vučković, D., Mašnić, J. (2018). Suvremena obrazovna vrijednost izučavanja narodne bajke – literarni, socijalni i psihološki elementi bajke u mediteranskom kulturološkom metanarativu. ANNALES – Series Historic et Sociologia, vol. 28, no. 1, 119–138.
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12. Vučković, D. (2016). Humor, igra i slobodna fantazija u poeziji Dejana Donovića. U: Kalezić-Radonjić, S. (ur.) Savremena crnogorska književnost za djecu i omladinu (147–180), Ratkovićeve večeri poezije i Institut za dječiju i omladinsku književnost, Bijelo Polje i Podgorica.
13. Vučković, D. (2015). O efektima začudnosti u poeziji Dragana Radulovića. U: Kalezić-Radonjić, S. (ur.) Stvaralaštvo Dragana Radulovića (66–91), Institut za dječiju i omladinsku književnost, Podgorica.
14. Vučković, D. & Čalović, S. (2014). Bazele psihopedagogice ale activităţii de predare la Universitatea din Muntenegru [Pedagogical and psycological foundation of teaching at the University of Montenegro]. In: Velea, S. (Ed.) Perspective asupra formării personalului didactic universitar in domeniul pedagogiei şi psihologiei educaţiei. str. 103-112 [pp. 222–231]. Universitatea de Vest din Timişoara / Departamentul pentru Pregătirea Personalului Didactic (Timişoara, România).
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