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COOLER CLIMATE CHALLENGE – CLIMATE ACTION FOR SUSTAINABLE EDUCATION

Krisztina Győrössy, Irén Nagy

Abstract

This study examines the impact of participation in an Erasmus+ strategic partnership project - Cooler Climate Challenge - on the environmental attitudes and behaviors of secondary school students from the Czech Republic, Spain, and Hungary. The goal of the research was to investigate how participation in a multinational Erasmus+ project influences secondary school students' environmental awareness and behavior. Grounded in experiential learning theory, the project combined inquiry-based, cooperative, and project-based learning methods to foster environmental awareness and intercultural collaboration. Using a mixed-methods approach, data were collected through a structured questionnaire featuring both closed- and open-ended questions. Quantitative responses were analyzed using descriptive statistics and Chi-squared tests, while qualitative data were analyzed using thematic analysis. The findings suggest that students initially exhibited environmentally conscious behaviors, with relatively few statistically significant differences observed between countries. However, following the program, students demonstrated increased environmental awareness, greater motivation to engage in sustainable behaviors, and an enhanced sense of global responsibility. The international, real-life context of the project also contributed to the development of communication skills and intercultural competence. Despite limitations related to sample size and generalizability, the study offers empirical insights into the educational value of Erasmus+ programs and presents a replicable model for integrating experiential, interdisciplinary environmental education in secondary schools. Implications for educators and policymakers highlight the importance of embedding sustainability education in collaborative, cross-cultural learning environments.

Keywords: Erasmus, environmental education, secondary school, sustainability

Introduction

In the 21st century, raising awareness of human activities and their impact on the environment has become a central focus of environmental education. International collaborations, such as the Erasmus+ programs, provide valuable opportunities for students to engage in practical activities related to nature conservation, environmental protection, and waste management. These programs align with the experiential learning theory, which emphasizes learning through reflection on practical experiences. According to Kolb (1984), such hands-on activities allow students to actively engage with real-world issues, deepening their understanding and fostering long-term environmental awareness. A wide range of educational methods are currently regarded as effective tools for developing students' environmental attitudes toward sustainability (Michelsen & Fisher, 2017). While recent studies have predominantly concentrated on early childhood and primary education (Collado, 2020; Sukma et al., 2020), it is equally important to offer environmental education alternatives for secondary school students that promote sustainability and encourage thinking beyond the classroom. Over the past decade, numerous educational programs have been introduced within the Erasmus+ framework. A key feature of these programs is the opportunity to gain hands-on experience and access to learning environments that are internationally oriented (Nada & Legutko, 2022). Specifically, Erasmus+ strategic partnerships aim to facilitate the exchange of experiences, best practices, and innovative approaches, alongside promoting multilingualism at the international level (Donne, 2016). Additionally, one of the current priorities of Erasmus+ is 'environmental sustainability and climate change mitigation,' which focuses on developing the skills necessary to promote sustainable practices (European Commission, 2024). These collaborations offer valuable opportunities for both students and teachers to engage in environmental initiatives while also enhancing participants' communication skills (Özer, 2024). Furthermore, such programs have been shown to

yield a variety of positive impacts on students' personal and academic lives (Hobai, 2024). Unfortunately, education for environmental sustainability at a secondary school level is less enhanced; only 26 KA2 case studies, which support cooperation between organizations and institutions, were presented in the final report of the Erasmus+ projects from the past eight years by the European Commission (2022). Non-formal education methods, for instance, project-based learning activities might offer those values for secondary school students that promote the development of their "twenty-first century skills" (Binkley *et al*., 2011; Gîmbuță, 2016) while considering environmental issues. This study investigates how participation in a multinational Erasmus+ project influences secondary school students' environmental awareness and behavior. It employs a case study approach to examine the impact of the Erasmus+ strategic partnership project *Cooler Climate Challenge* on secondary school students' environmental attitudes and behaviors. The case involves three partner schools across the Czech Republic, Spain and Hungary, and focuses on the participants' experiences, attitudes, and learning outcomes during the two-year implementation period.

The study employs mixed methods of data collection and analysis, combining both quantitative and qualitative data to provide a comprehensive understanding of the project's impact. Data collection included closed-ended survey responses to assess changes in environmental attitudes (quantitative), as well as open-ended questionnaire items that allowed students to express their opinions and motivations in greater depth (qualitative). In addition, project documentation and informal observations during the mobilities were used to contextualize the findings and triangulate the results.

The project offers a replicable model of practice that combines inquiry-based, cooperative, and project-based learning within an international mobility framework. This shows how these pedagogical strategies can be integrated into environmental education to promote real-world engagement. It reinforces the educational value of Erasmus+ programs in achieving Sustainable Development Goals, especially climate action and global citizenship education. In addition, the study provides empirical evidence on the impact of Erasmus+ projects on environmental attitudes in secondary education across diverse cultural contexts.

Goals and objectives

The Erasmus+ strategic partnership program entitled *Cooler Climate Challenge* (CCC) was designed to address one of the core priorities of the Erasmus+ framework and to promote 'Climate Action' as outlined in the United Nations' 17 Sustainable Development Goals (2015). The primary objective was to enhance the environmental awareness of both students and teachers, foster active engagement in environmental protection, and deepen participants' knowledge of environmental issues and related problem-solving skills. The project involved twelve teachers from various disciplines and forty-nine secondary school students (aged 15–18) from three European schools located in the Czech Republic, the Canary Islands, and Hungary, with coordination led by the Czech institution. Initially approved for a two-year implementation period (2020–2022), the project was extended by one academic year due to restrictions imposed by the COVID-19 pandemic.

Methodology

The project, categorized as a KA229 School Exchange Partnership, was submitted by the coordinating institution, Obchodní Akademie T. G. Masaryka in Kostelec nad Orlicí, Czech Republic. Partner institutions included IES El Médano in Tenerife, Spain, and Kürt Alternative Secondary School in Budapest, Hungary. The application was collaboratively prepared by coordinating teachers from all three schools, which facilitated initial professional rapport prior to the commencement of project mobilities.

Despite institutional differences – one being a vocational school, another a state school, and the third a private school – the consortium established shared objectives focusing on three key areas: environmental and climate change, the social and environmental responsibility of educational institutions, and the promotion of international cooperation and partnerships. Due to pandemic-related restrictions, initial meetings among staff were held online, and student collaboration was facilitated through the eTwinning platform. An online competition was also conducted among students to design the official project logo.

Participants of the project were selected on the basis of the following criteria: interest in the project's theme and goals, willingness to participate in preparatory and follow-up activities, willingness to collaborate with students from other cultures. Priority was given to students with fewer opportunities and to students who demonstrated consistent attendance at school. Given that the project was planned for a duration of 24 months, only students in the 9th grade or in their language preparatory year were eligible for participation, ensuring their availability for the entire duration of the project.

During the mobility preparations, various active learning methods were emphasized, including inquiry-based learning, cooperative learning, and project-based learning. Students were accommodated with host families affiliated with the participating schools, providing them with authentic, real-life intercultural experiences throughout the mobilities.

Prior to the organization of mobility activities, participating students completed a 17-item questionnaire aimed at assessing their environmental attitudes. The instrument included nine single-response, closed-ended multiple-choice questions. Three items utilized a 5-point Likert scale to evaluate students' environmental attitudes in greater depth. One multiple-response, multiple-choice question with seven options was included to explore students' motivations for participating in the project. Additionally, one open-ended question invited students to express their personal opinions. The final three items addressed feedback on the structure of the questionnaire and provided space for any additional comments students wished to share.

All statistical tests and graphical representations were carried out using RStudio (R version 4.x) with relevant packages, while the open-ended responses were examined through qualitative content analysis.

Results of the pilot questionnaire

During the pilot phase of the questionnaire, the primary objective was to gather preliminary insights into students' perceptions of climate change, their environmental awareness, and the environmental issues that concern them in their daily lives. A descriptive analysis

was first conducted to summarize basic demographic information; a total of 49 students completed the questionnaire. The sample included six items designed to assess whether students practice environmentally conscious behaviors both at home and at school.

One of the initial questions focused on students' typical modes of transportation when commuting to school in their hometowns. The results indicated that 65.3% of students used public transportation, 20.4% walked, and 14.3% commuted by car.

A Chi-squared test of independence was conducted to examine whether transportation habits differed significantly across the three locations. The results indicated a statistically significant association between location and mode of transportation ($p = .00865$), suggesting that transportation behaviors varied meaningfully by region (see Figure 1). Students in Hungary and the Czech Republic showed a higher preference for public transport, while students in the Canary Islands were more likely to walk. These patterns may reflect local infrastructure and geographic characteristics, such as urban density and school accessibility.

Further analysis showed that students in Hungary ($n = 13$) and the Czech Republic ($n = 24$) demonstrated a stronger preference for public transportation. In contrast, students from the Canary Islands ($n = 12$) were more likely to walk to school. These regional differences are likely influenced by local infrastructural and geographical contexts. For example, Budapest – the only capital city included in the study – has a larger urban layout, and students often commute from suburban areas. In the Czech Republic, many students live in nearby towns and villages, making public transport more practical. Conversely, on Tenerife, the school's central location allows most students to walk, reducing the need for public or private transportation.

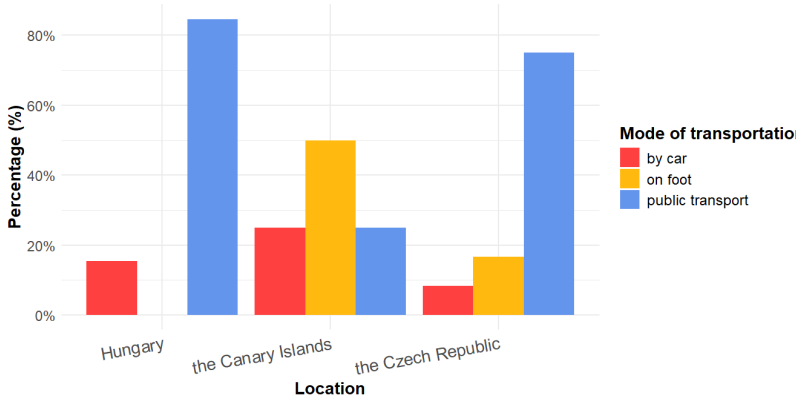

Figure 1. The transportation habits of students (source: Authors' own compilation)

To explore whether recycling behaviors differed across locations, a Chi-squared test of independence was performed. The results showed no statistically significant difference between countries (p = .09), although descriptive differences were observed (see Figure 2). Students in Hungary and the Czech Republic reported higher rates of consistent recycling compared to those in the Canary Islands. However, given the relatively small sample sizes, these differences may be attributed to random variation rather than systematic regional effects.

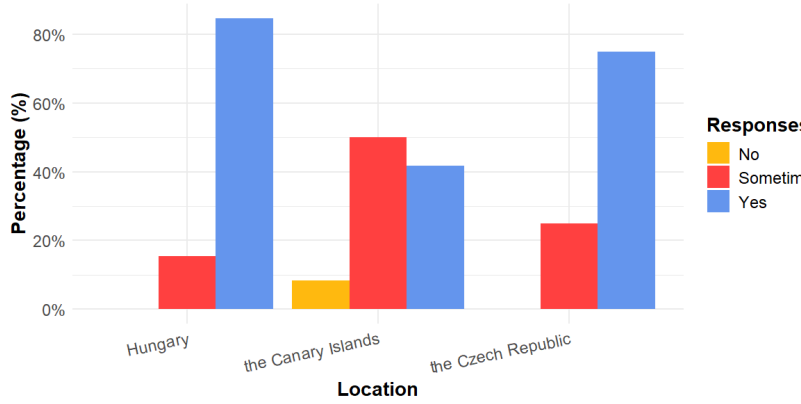

Figure 2. The recycling habits of students (source: Authors' own compilation)

Our survey also supported that all schools in the participating countries have containers for selective waste management, which is a positive indication of their environmental awareness. It was interesting to determine what students do with their batteries that do not function anymore. Fortunately, most students (55.1%) either take the non-functioning batteries to their nearest battery container or they (24.5%) rely on rechargeable batteries. There were ten students who said they would discard the non-functioning batteries in the trash (Figure 3).

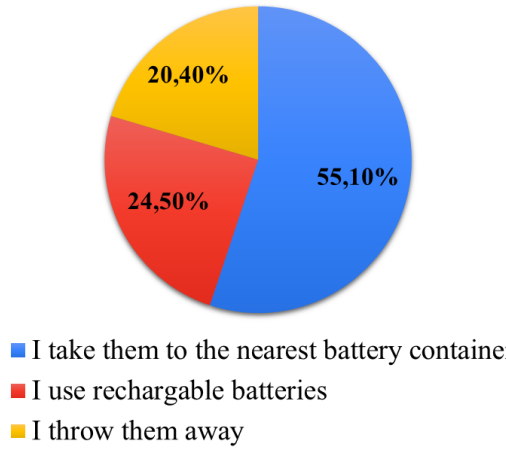

Figure 3. The fate of non-functioning batteries (source: Authors' own compilation)

According to the questionnaire, 30 students stated that they always turn off the lights when leaving a room, and no student reported forgetting to do so.

In the context of the digital era, we aimed to investigate what happens to students' electronic devices – such as mobile phones, laptops, and tablets – when they cease to function or are no longer wanted. Respondents were provided with multiple options, all of which were selected by at least one student.

The most common responses (24.5%) indicated that students either donate their devices to family members, parents or grandparents, for example, or simply store them away, typically in the back of their drawers (34.7%). A considerable proportion (22.4%) reported taking their devices to recycling centers, while 14.3% stated that they return them to the electronic store where the items were originally purchased. Notably, 4.1% of respondents admitted to discarding their devices as general waste when they are no longer needed (Figure 4).

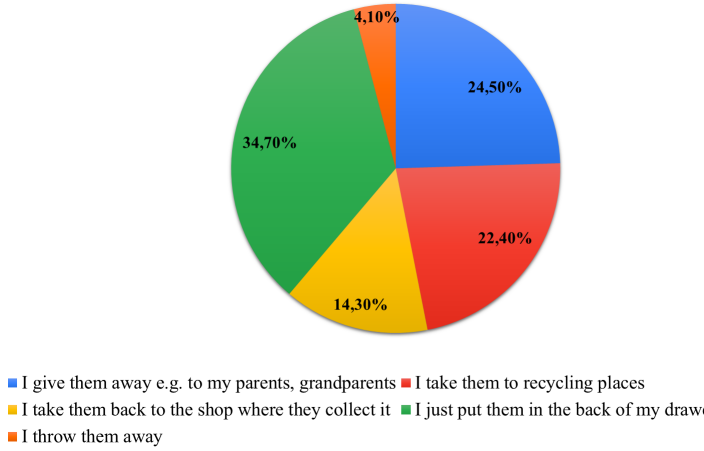

Figure 4. The fate of electronic devices (source: Authors' own compilation)

The study also sought to examine the existing environmental attitudes and behavioral characteristics of participating students, both in terms of their current practices and future intentions. The results of the characteristics are presented in Figures 5 and 6, which display the mean values derived from responses on a 5-point Likert scale (1=not at all, 5=totally), disaggregated by country. No statistically significant differences were found between students from the participating countries. However, it is certain that most students are amazed by the scenic beauty of different landscapes and they agree that it makes them healthier and more relaxed when walking in nature. It was also supported by the answers that they find it annoying if somebody throws away their garbage in the forest. Most of the participants also fear that the next generations will not experience the beauty of nature as it is nowadays (Figure 5).

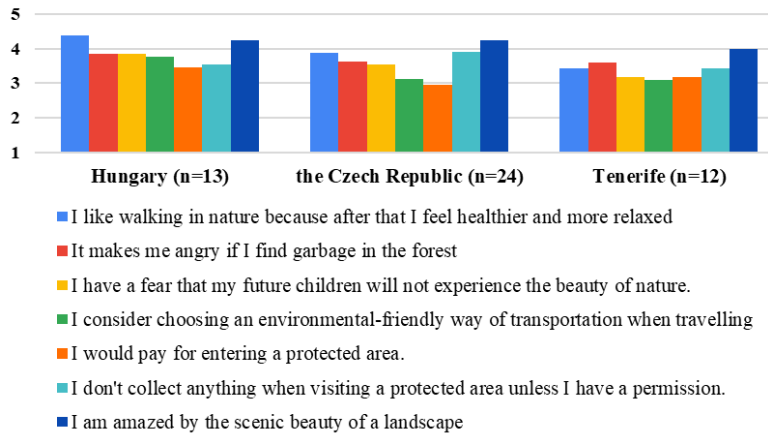

Figure 5 - Environmental attitudes and habits of students (source: Authors' own compilation)

Regarding taking actions in the present and/or in the future almost all responses were above the average on the Likert scale thus agreeing with those items being a characteristic habit or attitude for each of them. Many students stated that they are aware of the global effects of climate change one can experience in their own living environments.

It was also an agreement by most participants of all the locations that they need to take care of their surroundings even if their parents or grandparents had/have already done so, thus continuing sustainability for the next generations. Taking actions was highest among students on Tenerife - living in a closed island community must require strong cohesion and cooperation for creating a better future for them. The mean value of responsibility for the future of our planet was highest among Hungarian students (Figure 6).

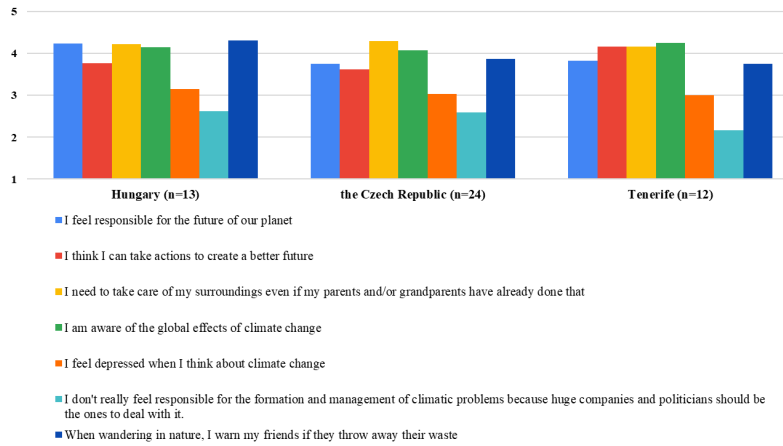

Figure 6 - Considering the present, the future and taking actions (source: Authors' own compilation)

Students were also asked about their motivations for participating in the project, with their responses shown in Figure 7. The majority of students expressed interest in meeting new people from different countries (79.6%), improving their English language skills (73.5%), and learning about new languages and cultures (73.5%).

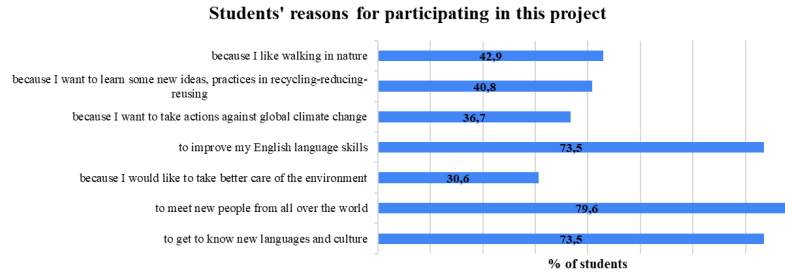

Figure 7 - Motivation of students (source: Authors' own compilation)

Additionally, the questionnaire included an open-ended question inviting students to reflect on their perceived ability to influence environmental issues and contribute to addressing climate change in the future. Qualitative analysis of the students' responses yielded the following results (Table 1):

Theme 1: Belief in Individual Responsibility

Most students expressed a strong conviction that individual action is meaningful in addressing climate change.

Subtheme 1.1: Small Acts Make a Difference

- Codes: recycling, awareness, small efforts
- Examples:

"Even a small act can help so we should recycle and spread awareness about this problem!"

"Yes, because I know that if we can convince the world to start recycling, Earth will improve a lot."

Subtheme 1.2: Moral Obligation and Personal Duty

- Codes: responsibility, duty, future
- Examples:

"Yes, because we are supposed to do that, if we don't there will be no planet for us in the future."

"Yes, we have to spread awareness to our family about climate change."

Theme 2: Collective Action

Responses often highlighted the need for broader collaboration and systemic support.

Subtheme 2.1: Need for Government or Institutional Support

- Codes: authority, systemic change, higher powers
- Examples:

"I think we can do a lot to help but people in higher positions should definitely help."

"We definitely can, with enough effort anything is possible, and with the right funding as well."

Subtheme 2.2: Importance of Collective Effort

- Codes: teamwork, global cooperation, collective action
- Examples:

"Yes I do! But we all need to put our hands together in order to save the world!"

Theme 3: Realism and Limitations

Some students acknowledged the limitations of individual efforts, expressing either cautious optimism or uncertainty.

Subtheme 3.1: Recognition of Larger Forces

- Codes: corporations, systemic issues, limited impact
- Examples:

"Even if there are huge companies which ruin the environment the most, our smaller steps can still make a difference!"

"As an individual I feel most of the responsibility isn't mine…"

Subtheme 3.2: Uncertainty about the Future

- Codes: pessimism, unknown future, disconnection from nature
- Examples:

"There will be helpful measures, but all and all life will be more artificial and we won't be connected with nature as much as we've been before."

"I'm not sure if we can solve it, but we can definitely slow the process."

Summary table of themes in students' responses to the open-ended question			
Themes	**Subthemes**		**Representative Codes**
Belief in Individual Responsibility	Small Acts Make a Difference	Moral Duty	recycling, awareness, responsibility
Collective Action	Systemic Support	Collective Effort	government, funding, teamwork
Realism and Limitations	Larger Forces	Uncertainty	corporations, limited impact, artificial future

Table 1 - The major themes of the responses of students (source: Authors' own compilation)

Results: The structure of the student mobility programs

During the implementation of the project, the three schools were engaged in collaborative activities based on the three R's of waste management („Reduce, Reuse, Recycle") focusing on the recycling, reducing and reusing practices of the three countries. Teacher mobilities were organized in the host countries to prepare for the activities carried out in the subsequent student mobilities. This not only enhanced the cooperation of international teachers but also provided them with experience in organizing collaborative classroom and outdoor activities, in environmental and sustainable education. These activities are described below in the detailed review of the student mobilities. Throughout the project, all these activities contributed to the development of students' critical thinking and problem-solving skills regarding environmental problems and climate change.

The first student exchange program was carried out in the Czech Republic. Eight enthusiastic students arrived from Tenerife and Hungary. During the one-week program, students compared the various characteristics of recycling methods of the three countries by designing leaflets and brochures in international groups. Each group fo-

cused on different recycling materials such as plastic, paper, glass and biowaste during the week. The program included a visit to the Marius Pedersen waste and recycling management center, where participants could experience the process of waste assortment. The students also gained insight into the lives of those businesses that deal with the recycling of these materials. To get to know the local flora and fauna of the area, a one-day trip was organized into the mountains of the Sudetes. Students could experience the harmony of natural and man-made environments and those ecosystems such as coniferous forests that need to be protected. As a result of the initial phase of the partnership, students became familiar with various international recycling methods while developing critical thinking, communication, and cooperation skills to broaden their understanding of global environmental issues.

The second student exchange offered insight into island biogeography as eight students from Hungary and the Czech Republic visited one of the volcanic islands, Tenerife of the Canary Islands. Throughout the week, students worked in international groups as their projects focused on conserving our natural resources and reducing methods. The outcome of the project was the creation of five videos to draw attention to the adequate use of water energy, the reduction of plastic waste, the awareness of energy use, transportation methods and electronic wastes.

During the week spent on the island, students gained experience in outdoor learning settings to further develop their understanding regarding renewable energy sources. As a result of this, we visited the base of the ITER (Institute for Technology and Renewable Energy) company that is responsible for the management of various renewable energy sources. Students could learn about the work of wind turbines as they had the opportunity to enter one of them. They also learned about the importance of passive houses, the work of sundials as well as the everyday methods of reducing greenhouse gases. The one-week program also included a visit to the Teide National Park where we learned about the geography of volcanism including the formation of lava flows, magmatic and volcanic rocks. Participants had the rare opportunity to see sunspots and solar flares using the telescopes of the observatory at an altitude of 2390 meters. After sunset, we continued to deepen our understanding of astronomy. Thanks to the clear skies,

high altitude, and low light pollution regulations of the island, we were able to observe the Milky Way, along with the varied coloration and luminosity of distant stars. The school was located in proximity to the ocean, which provided an opportunity to engage with the local marine conservation initiatives. As part of the program, students participated in a beach cleanup activity and conducted observations of microplastic pollution along the coastal zones. Furthermore, they were involved in the concluding phase of a marine turtle conservation effort organized by Terramare Medioambiente, during which they supported the local team in the release of a rehabilitated loggerhead sea turtle (Caretta caretta) into its natural marine environment.

The third mobility, centered on the theme of reusing, was hosted in Budapest, Hungary. The five-day program commenced with an introduction to the project topic, followed by the formation of international student teams. To activate students' prior knowledge, participants created an associative word cloud and collaboratively shared reusing practices from Hungary, the Czech Republic, and Spain on a Padlet platform. Throughout the mobility, students maintained reflective project diaries, documenting insights and experiences from the various activities. Participants visited the South Pest Wastewater Treatment Plant, where they observed the preliminary stages of wastewater treatment and gained firsthand understanding of the facility's operations. This was followed by a Zero-Waste workshop at Humusz Ház, introducing diverse recycling strategies. In an upcycling workshop, students and teachers creatively decorated reusable tote bags using pre-made stamps, including the project›s logo. To explore environmentally conscious traditions rooted in local history, participants visited the Eco-Village in Agostyán, where they sampled herbal teas and observed a bird-ringing demonstration. They also engaged in interactive learning at Tata Castle, where guided activities introduced them to the region's cultural and geological heritage, spanning centuries and even millions of years. Finally, to appreciate Budapest's natural treasures, students explored the Szemlő-hegy Cave, often referred to as the city's "underground flower garden." While breathing its therapeutic air, participants listened to a guided explanation of the cave's formation and unique mineral features, including the distinctive "stone flowers" adorning its walls. The culminating activity of the project was a student-led exhibition show-

casing the final products created by international teams. Each group designed either a functional or decorative item made from previously collected household waste, highlighting the principles of reuse and sustainability. Materials included a diverse range of discarded items, such as plastic bottles, toilet paper rolls, and fabric remnants from a clothing swap initiative. During the exhibition, students presented their creations to guests, offering brief explanations of the materials used and the inspiration behind their designs. The finished products – ranging from can lanterns intended for garden decoration and a broom made from plastic bags to handmade penholders and small sculptural figures – were subsequently displayed in a glass case in the school corridor. This allowed the wider school community to view the outcomes of the project and engage with the environmental messages conveyed through the students' work.

The project revealed that participation in an international, experience-based learning environment significantly enhanced students' environmental awareness and positively influenced their attitudes toward sustainability. Students reported greater motivation to engage in eco-friendly behaviors, increased interest in environmental issues, and a stronger sense of responsibility as global citizens. The collaborative and project-based approach also improved their communication, problem-solving, and intercultural skills. These findings suggest that integrating experiential and interdisciplinary methods into environmental education – especially within international frameworks – can have meaningful and lasting impacts on students' perspectives and practices. For educators, this underscores the value of designing learning experiences that connect classroom knowledge with real-world, cross-cultural challenges.

Conclusion

The overall program of mobilities focused on the principles of recycling, reusing, and reducing. We can conclude that all of these are essential steps towards building a more sustainable and environmentally responsible world. Through this project, our students were able to explore how small changes in their daily habits - such as sorting waste properly, repurposing items, and reducing the use of single-use

materials - can significantly reduce our ecological footprint. The results of the pilot questionnaire also support the idea that the participating students are already concerned with environmental problems, continuously seeking alternative solutions while feeling responsible for the environment and living in an environmentally conscious manner. Furthermore, even though our goal is common, there might be regional differences regarding our everyday habits and attitudes towards sustainability as well as environmental awareness. It also suggests that secondary school teachers of all subjects have an essential role in environmental education.

These actions not only helped conserve natural resources and reduce pollution but also promoted a culture of mindfulness and responsibility. Furthermore, the programs enhanced the cooperation, communication and language skills of secondary school students while also providing practical activities aimed at raising environmental awareness and broadening their attitudes as well as knowledge concerning environmental issues. As teachers, we have the responsibility to continue implementing these practices and inspire others to do likewise, thus contributing to a cleaner, healthier planet for future generations.

While the findings of this study may offer valuable insights for educators across various educational contexts, it is important to acknowledge that the interventions were implemented within an international framework, which may have influenced their generalizability. Additionally, the relatively small sample size, constrained by the budget, may limit the representativeness of the data. Despite these limitations, the study offers valuable practical and strategic insights for educators and policymakers. The findings highlight that international mobility programs like Erasmus+ can positively influence students' environmental attitudes, even suggesting that cross-cultural experiences deepen engagement with global challenges. It also emphasizes that the use of project-based, inquiry-driven, and cooperative learning methods was effective in developing environmental awareness and provides useful teaching ideas. The methodology that was applied in the research - questionnaires, mixed methods, local actions - can be replicated or adapted in other schools or even other countries.

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Appendix

Students' responses to the open-ended question:

"Yes, because we are supposed to do that, if we don't there will be no planet for us in the future."

"As an individual I feel most of the responsibility isn't mine, but I am taking measures every day to slow the destructive process of global climate change."

"I think we can do a lot to help but people in higher positions should definitely help. I don't know if we can solve everything without their help."

"We definitely can, with enough effort anything is possible, and with the right funding as well."

"Yes, we have to spread awareness to our family about climate change."

"Yes, because I know that if we can convince the world to start recycling, Earth will improve a lot."

"Yes, even a small act can help so we should recycle and spread awareness about this problem!"

"Yes I do! But we all need to put our hands together in order to save the world!"

"Yes I think we can, because people can no longer ignore the problems that are caused by climate change."

"There will be helpful measures, but all and all life will be more artificial and we won't be connected with nature as much as we've been before."

"I'm not sure if we can solve it, but we can definitely slow the process. Even if there are huge companies which ruin the environment the most, our smaller steps can still make a difference!"

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