Co-funded by
the European Union

CREA+BIRD
Through education to
a deeper connection with nature

Creative Methodologies for Sustainability Education Inspired by Birds (CREA+BIRD)

2024-1-FI01-KA220-SCH-000244170

1.12.2024 – 30.11.2027

ACT. 2.5: THE INITIAL TOOLKIT OF EDUCATIONAL MATERIALS FOR THE INTERNATIONAL SEMINAR

Deliverable number: 2.5

Work package: WP2 – Compare: collecting and comparing creative methodologies for sustainability education
Lead partner: UL
Due date: 31.7.2025
Dissemination level: Public

This project has received funding from the European Union's Erasmus+ programme under grant agreement No. 2024-1-FI01-KA220-SCH-000244170. Neither the European Commission nor any person acting on behalf of the Commission is responsible for how the following information is used. The views expressed in this publication are the sole responsibility of the authors and do not necessarily reflect the views of the European Commission. More information about Erasmus + project funding https://erasmus-plus.ec.europa.eu/

Index of acronyms

D	Deliverable
EU	European Union
GA	Grant Agreement
GDPR	General Data Protection Regulation
RRI	Responsible Research and Innovation
STEM	Science, Technology, Engineering, Mathematics
STEAM	Science, Technology, Engineering, Arts, Mathematics
STS	Science, Technology and Society
WP	Work Package

Partnership

Ref.	OID	Legal name	Country	Region	City	Website	Acronyms
P1	E10208640	JYVASKYLAN YLIOPISTO	Finland		Jyvaskyla	http://www.jyu.fi	JYU.FI
P2	E10208740	LIBERA UNIVERSITA DI BOLZANO	Italy		Bolzano	www.unibz.it	UNIBZ.IT
P3	E10208220	UNIVERSITATEA DE VEST DIN TIMISOARA	Romania	Vest	Timisoara	www.uvt.ro	WUT.RO
P4	E10209243	UNIVERZA V LJUBLJANI	Slovenia	Osrednjes lovenska	Ljubljana	http://www.uni-lj.si	UL.SI
P5	E10154029	DRUSTVO ZA OPAZOVANJE IN PROUCEVANJE PTIC SLOVENIJE - DOPPS BIRDLIFE SLOVENIJE ZDRUZENJE	Slovenia		Ljubljana	www.ptice.si	DOPPS.SI
P6	E10359479	Suomen luonto- ja ympäristökoulujen liitto ry	Finland		Tampere	www.luontokoulut.fi	LYKE.FI
P7	E10362474	Parco naturale Adamello Brenta	Italy	Provincia Autonoma di Trento	Strembo	https://www.pnab.it/	PNAB.IT
P8	E10016244	"Milvus Group" Association	Romania	Centru	Tîrgu mureş	www.milvus.ro	MILVUS.RO

History of changes

Version	Date	Modifications	Prepared by (organization)	Approved by
1	18. 7. 2025	First preliminary draft	UL	
2	24. 7. 2025	Partners contributions	All partners	
3	31. 7. 2025	Final document	UL	Coordinator: JYU.FI

Table of contents

Table of figures

Executive Summary

The CREA+BIRD project empowers teachers and educators to design, adopt, and share innovative teaching modules that foster the European sustainability competence framework GreenComp and advance sustainability education for students and future EU citizens. This report (Act. 2.5) is a starter toolkit of educational materials for the upcoming International Seminar in Koper. The toolkit provides organizational guidelines on the seminar's structure and methodology and supports the creation of the International Learning Nest—a community of experts in sustainability education and bird ecology.

First chapter presents Deliverable 2.1, which developed a methodology for analyzing teaching practices through the GreenComp framework. The resulting Theoretical Framework for the Analysis of Teaching Practices (TFATP) integrates learning objectives, content, and pedagogical scaffolds to build sustainability competences. Teaching practices are further situated within the Sustainable Development Goals (SDGs), using the SDG Wedding Cake as conceptual tool, while stressing the pivotal role of SDG 4 (Quality Education) in advancing the 2030 Agenda. A review of learning theories underlines the importance of transformative learning, which goes beyond knowledge transfer to foster reflection and worldview change. Similarly, STE(A)M education is presented as a powerful way to combine scientific literacy and creativity in tackling real-world sustainability challenges. The chapter also introduces GreenComp, which defines four interrelated competence areas and twelve key competences. This framework provides a shared European basis for embedding sustainability across lifelong learning, supporting both individual agency and collective transformation.

An analysis of sustainability teaching practices in Finland, Italy, Romania, and Slovenia showed that most activities targeted small to medium groups in primary and lower secondary schools, with limited focus on upper secondary or teacher training. While Finland and Slovenia favored outdoor or mixed environments, Italy and Romania worked mainly indoors. The GreenComp analysis revealed strong emphasis on values and complexity, but weaker coverage of futures literacy and political agency. SDG alignment was strongest with biosphere goals, with limited integration of economic aspects. Teaching centered on science and the arts, while engineering and other STEM fields were underrepresented. Cognitive outcomes were well captured, but affective and psychomotor dimensions proved harder to assess. The findings highlight the need to broaden teaching contexts, strengthen underdeveloped competences, integrate all SDG dimensions, expand STEM coverage, and refine the assessment of non-cognitive learning.

The final chapter presents case studies from Finland, Italy, Slovenia, and Romania, prepared by participating teachers. These examples illustrate diverse ways of addressing education for sustainable development in schools, with commentary on their strengths, areas for improvement, and lessons for designing new activities within the learning nests.

1 Introduction

The CREA+BIRD project aims to empower teachers and educators to design, adopt, and disseminate innovative teaching modules that foster the European sustainability competence framework GreenComp and advance sustainability education for students and future EU citizens. Supported by researchers and experts, teachers are encouraged to establish communities of practice dedicated to developing creative approaches for embedding green competencies in education.

At its core, the project promotes co-creation and the sharing of pedagogical tools for sustainability education, using birds as an inspiring, unifying theme to operationalize the GreenComp framework. By integrating cultural narratives about birds with scientific knowledge, CREA+BIRD enriches creative processes and deepens learners' connection with nature. It advances sustainability education by collecting, comparing, and co-creating pedagogical methods. Through collaborative and participatory action research methodologies, the project empowers educators and students, enriches learning experiences, and encourages active engagement with sustainability challenges. The project brings together experienced educators and environmental organizations from four countries with expertise in bird research. These national associations are well networked with schools and teachers in their respective contexts and also provide in-service teacher training. Consequently, the project contributes significantly to both pre-service and in-service teacher education. Methodologically, it builds on action research principles, grounded in teacher-led initiatives that explore innovative teaching strategies. The project also benefits from the expertise of leading researchers in teacher education and sustainability, strengthening collaboration between universities, associations, and schools. By bridging initial and in-service teacher education, as well as formal and non-formal learning, CREA+BIRD contributes to the effectiveness of sustainability education through the development of creative methodologies. Ultimately, it supports transformative initiatives that inspire sustainable action and contribute to a more resilient and equitable future.

Within this framework, Work Package 2 (WP2) focuses on collecting, analyzing, and comparing transformative and creative teaching practices in sustainability education. The purpose of this report (Act. 2.5) is to prepare a starting toolkit of educational materials for the upcoming International Seminar in Koper. This toolkit will provide organizational guidelines on the seminar's structure and methodology, as well as for the establishment of the International Learning Nest—a learning community of experts and practitioners in sustainability education and specialists in bird ecology and conservation.

The present report builds on and synthesizes previous outputs (Act. 2.1, 2.2, and 2.3), which developed the theoretical framework, identified effective teaching practices, and curated examples aligned with the European sustainability competences (GreenComp). Together, these serve as the foundation for preparing the organizational guidelines of the International Seminar (Act. 2.6).

2 Theoretical framework

Chapter Objectives

- Understand the Theoretical Framework for the Analysis of Teaching Practices (TFATP), developed to analyze teaching practices using the GreenComp framework.
- Explain the role of learning objectives (cognitive, affective, and psychomotor) in structuring holistic sustainability education.
- Recognize the significance of aligning educational content with the Sustainable Development Goals (SDGs) and the nested systems of biosphere, society, economy, and partnership.
- Describe how transformative learning theories (first-, second-, and third-order learning) support critical reflection and systemic change.
- Assess the potential of STE(A)M education and scientific literacy in fostering creativity, innovation, and problem-solving for sustainability.
- Analyze the European Sustainability Competence Framework (GreenComp) and its 12 competences as a flexible, non-hierarchical basis for embedding sustainability across education.

Provide recommendations for educators to improve the effectiveness and inclusiveness of sustainability education. The goal of Deliverable 2.1 was to develop a methodology for analyzing teaching practices based on the GreenComp framework, which will be applied in the next phase of the project. From this process, a Theoretical Framework for the Analysis of Teaching Practices (TFATP) was developed and is summarized in the accompanying figure. The framework builds on the four competence areas of the European sustainability competence framework (GreenComp). To support the development of these competencies, the roles of cognitive, affective, and psychomotor learning objectives were examined. In addition, the importance of learning content was emphasized, particularly its alignment with the Sustainable Development Goals (SDGs) and the hierarchical structure of nested systems within the categories of biosphere, society, economy, and partnership. The framework also highlights the role of scaffolds in providing students with opportunities for transformative learning, with particular emphasis on the potential of STEAM education. These scaffolds represent educational strategies that can support the implementation of teaching practices, which will be further evaluated and developed as part of the CREA+BIRD project.

The figure 1 below illustrates the TFATP, which is explained in greater detail in the following section.

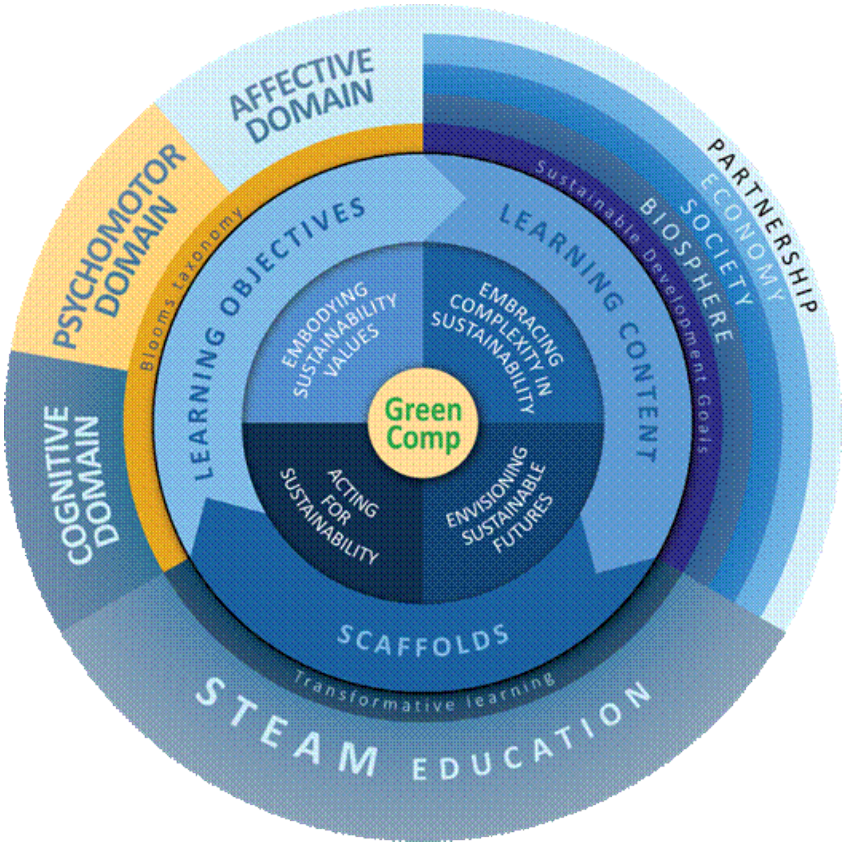


Figure 1: CREA+BIRD methodology theoretical framework.

2.1 Learning Objectives

Learning objectives describe what students should achieve by the end of a lesson, guiding teaching, assessment, and student progress. One of the most influential frameworks for structuring objectives is **Bloom's Taxonomy** (Bloom, 1956), later revised by Anderson and Krathwohl (2001). It promotes higher-order thinking and organizes learning into three domains:

- Cognitive domain – focuses on knowledge and thinking skills, progressing from Remembering and Understanding to Applying, Analyzing, Evaluating, and ultimately Creating.
- Affective domain – addresses emotional engagement and values, moving from Receiving and Responding to Valuing, Organizing, and Characterizing values that shape behavior (Krathwohl, 2002).
- Psychomotor domain – relates to physical skills, from Perception and Guided response to advanced stages like Adaptation and Origination (Simpson, 1972).

By integrating all three domains, Bloom's framework supports holistic learning that develops knowledge, emotional connection, and practical skills. In the context of sustainability education, it offers a structured way to build critical

thinking, problem-solving abilities, and values aligned with the Sustainable Development Goals (SDGs), preparing learners to act responsibly for a sustainable future (UNESCO, 2014).

2.2 Sustainable Development Goals

Sustainable development is commonly defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). To address global challenges, UNESCO promotes Education for Sustainable Development (ESD), which equips learners with the knowledge, skills, values, and attitudes needed to make informed decisions and contribute to a more sustainable future (UNESCO, n.d.).

In 2015, all UN member states adopted the **Sustainable Development Goals** (SDGs; Figure 2)—17 global goals designed to end poverty, protect the planet, and ensure peace and prosperity by 2030 (United Nations, n.d.-a). They build on the Millennium Development Goals but are broader in scope, supported by measurable targets and indicators updated annually to reflect policy priorities (Eurostat, 2025). Recent progress has been most notable in reducing poverty (SDG 1), inequalities (SDG 10), and advancing decent work and economic growth (SDG 8) (Eurostat, n.d.).

Among these, SDG 4 (Quality Education) is central, as inclusive and equitable education is essential for achieving most other goals. However, progress remains slow, with stagnating completion rates and declining learning outcomes in many countries (Independent Group of Scientists, 2023). Strengthening SDG 4 is therefore critical to advancing the entire 2030 Agenda (Bianchi et al., 2022).

To better conceptualize the SDGs, two models are often used. The 5P model groups the goals into five pillars: People, Planet, Prosperity, Peace, and Partnership. A more recent visualization is the **SDG Wedding Cake Model**, which emphasizes a hierarchy (Figure 3): Biosphere as the foundation (SDGs 6, 13, 14, 15), Society (SDGs 1–5, 7, 11, 16), Economy (SDGs 8–10, 12), and Partnership (SDG 17) as the integrating element (Fet et al., 2023).

Integrating SDGs into education has proven effective in promoting sustainability across diverse fields such as architecture (Bertone et al., 2024), antimicrobial resistance education (Nowbuth & Parmar, 2024), and dentistry (Cugati, 2024). In this way, ESD aligns directly with SDG 4, equipping learners to contribute to a more sustainable and resilient future.

Figure 2:Sustainable Development Goals (United Nations, n.d.-a)

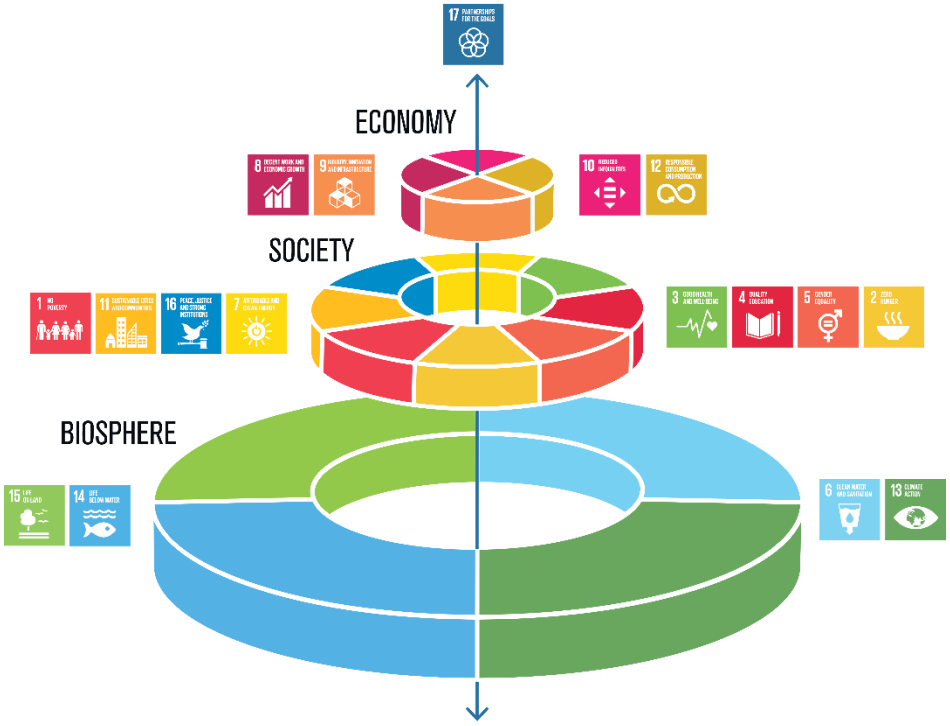


Figure 3:The illustration of the SDGs wedding cake is free to use under the Creative Commons license CC BY-ND 3.0

2.3 Transformative Learning in Sustainability Education

While education for sustainable development emphasizes behavior change, it is often difficult to clearly define the behaviors being taught or learned (Heimlich & Ardoin, 2008). Addressing today's systemic challenges—uncertainty, complexity, and unsustainability—requires new ways of thinking and acting (Sterling, 2010). Yet, as Orr (2017) notes, educational success does not automatically translate into sustainable behavior. This has led sustainability educators to draw on learning theories, particularly transformative learning.

Transformative learning extends constructivist theories by emphasizing reflection, critical awareness, and the reshaping of worldviews (Mezirow, 1978, 2000). It challenges learners to uncover and question the cultural and social assumptions that shape their perspectives, enabling both personal and social change (Freire, 1970). Sterling (2010) distinguishes three "orders" of learning:

- First-order – incremental change within existing assumptions (doing things better).
- Second-order – critical reflection on assumptions, leading to significant shifts in thinking (doing better things).
- Third-order – epistemic change, or reframing the very way we perceive and construct knowledge (seeing differently).

Most formal education remains at the first order—focused on information transfer—limiting its capacity to foster sustainability. By contrast, second- and third-order learning enable transformative, systemic change and are therefore crucial for sustainability education.

2.4 STE(A)M Education and Scientific Literacy

Scientific literacy—the ability to apply scientific concepts to personal, civic, and professional life—is essential for addressing today's socio-economic and environmental challenges (McComas, 2014). STEAM education integrates Science, Technology, Engineering, Arts, and Mathematics into a holistic approach that mirrors how these fields intersect in real-world problem-solving (Khine, 2019).

STEAM is grounded in constructivism and inquiry-based learning (IBL), encouraging students to explore, question, and engage in processes similar to real scientific research (Llewellyn, 2013). Integration can occur at different levels: disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary (Vasquez, 2013; English, 2016). The addition of Arts emphasizes creativity—an essential driver of innovation, knowledge creation, and problem-solving (Clements & Sarama, 2021; OECD/PISA, 2024).

By combining critical reflection from transformative learning with the inquiry-driven and creative focus of STEAM education, sustainability education can equip learners not only with knowledge, but also with the capacity to reimagine and enact more sustainable futures.

2.5 European Sustainability Competence Framework GreenComp

To support the progress towards SDG4, the European Commission published the European sustainability competence framework GreenComp (Figure 4), which defines what sustainability is as a competence and how it can be developed through the educational system. It also provides a common reference basis for dialogue, exchange of practices and peer learning among educators involved in lifelong learning across the EU. Moreover, it helps make the competences portable and promote mobility in the EU for a full participation in European society (*Bianchi et al*. 2022).

AREA	COMPETENCE	DESCRIPTOR
1 Embodying sustainability values	1.1 *Valuing sustainability*	To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values
	1.2 *Supporting fairness*	To support equity and justice for current and future generations and learn from previous generations for sustainability.
	1.3 *Promoting nature*	To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems.
2 Embracing complexity in sustainability	2.1 *Systems thinking*	To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems.
	2.2 *Critical thinking*	To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions
	2.3 *Problem framing*	To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems.
3 Envisioning sustainable futures	3.1 *Futures literacy*	To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future.
	3.2 *Adaptability*	To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk.
	3.3 *Exploratory thinking*	To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods.
4 Acting for sustainability	4.1 *Political agency*	To navigate the political system, identify political responsibility and accountability for unsustainable behaviour, and demand effective policies for sustainability.
	4.2 *Collective action*	To act for change in collaboration with others
	4.3 *Individual initiative*	To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet.

Figure 4:GreenComp framework with descriptors.

The framework defines sustainability as prioritizing the needs of all life forms while keeping human activities within planetary limits. Developing sustainability competencies requires a shift from passive knowledge acquisition to active learning that addresses cognitive dissonance. GreenComp provides a flexible framework—not a prescriptive set of rules—for embedding sustainability as a core competence across education.

It identifies four interrelated competence areas, each with three key competences, forming a set of 12 equally important, non-hierarchical building blocks of sustainability competence. These competences are further illustrated through case studies in the following chapters.

Chapter Summary

This chapter presents Deliverable 2.1, which developed a methodology for analyzing teaching practices through the GreenComp framework. The resulting Theoretical Framework for the Analysis of Teaching Practices (TFATP) integrates learning objectives, educational content, and pedagogical scaffolds to foster sustainability competencies. Drawing on Bloom's Taxonomy, the framework emphasizes the cognitive, affective, and psychomotor domains as complementary drivers of holistic learning.

The chapter situates teaching practices within the Sustainable Development Goals (SDGs), highlighting the relevance of the 5P model and the SDG Wedding Cake as conceptual tools. It stresses the central role of SDG 4 (Quality Education) in advancing the 2030 Agenda.

A review of learning theories underscores the importance of transformative learning, which moves education beyond information transfer towards critical reflection and worldview change. Similarly, STE(A)M education is identified as a powerful approach to build scientific literacy and creativity, aligning with sustainability challenges in real-world contexts.

Finally, the chapter introduces the European Sustainability Competence Framework (GreenComp), which identifies four interrelated competence areas and twelve equally important competences. This framework provides a shared European basis for embedding sustainability as a competence across lifelong learning, fostering both individual agency and collective transformation.

3 Collecting and Comparing Creative Methodologies for Sustainability Education

Chapter Objectives

- Present a short summary of the international report (Act. 2.3).
- Use the theoretical framework to analyze and compare teaching practices from **Finland, Italy, Romania, and Slovenia**.
- Identify **strengths, gaps, and opportunities** for advancing sustainability education.
- Highlight cross-country differences in teaching practices, learning environments, and integration of sustainability competences.
- Provide recommendations for educators to improve the effectiveness and inclusiveness of sustainability education.

3.1 Class sizes & student levels

Most activities involved groups of 6–30 students, with Italy showing the greatest variation, including very small and very large groups. Examples focused primarily on primary and lower secondary education, while upper secondary and teacher training were underrepresented in Slovenia and Romania, indicating areas for future development.

3.2 Duration & learning environments

The majority of sessions were designed as single lessons, though longer formats (weeks or months) were also reported. Indoor teaching dominated in Italy and Romania, while Finland and Slovenia emphasized outdoor or mixed environments.

3.3 GreenComp analysis

The most frequently addressed competence areas were Embodying sustainability values and Embracing complexity, followed by Acting for sustainability and Envisioning sustainable futures. National differences emerged: Systems thinking was missing in Finland, and Futures literacy in Romania. Across all reports, Futures literacy and Political agency remain challenging competences, highlighting areas for further development (see Figure 5)

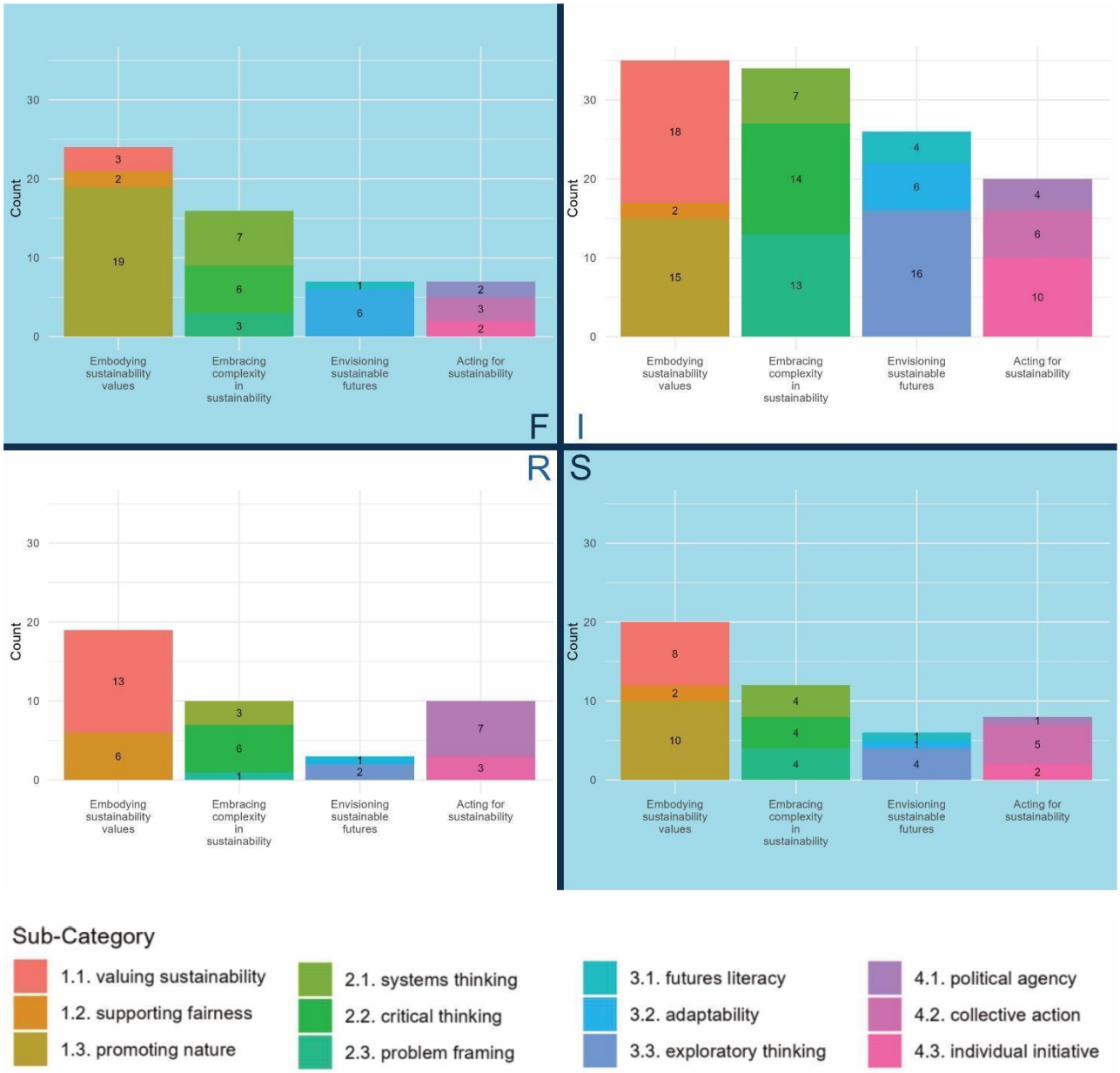


Figure 5: Greencomp competence areas for Finland (F), Italy (I), Romania (R) and Slovenia (S).

3.4 SDG alignment

Most activities related to SDG 15 (Life on Land) and the biosphere dimension (SDGs 6, 13, 14, 15). Italy emphasized the societal dimension slightly more, while the economic dimension was least represented, particularly absent in Finland (Figure 6 & 7). Stronger integration across multiple SDG dimensions is recommended to reflect sustainability's interconnected nature.

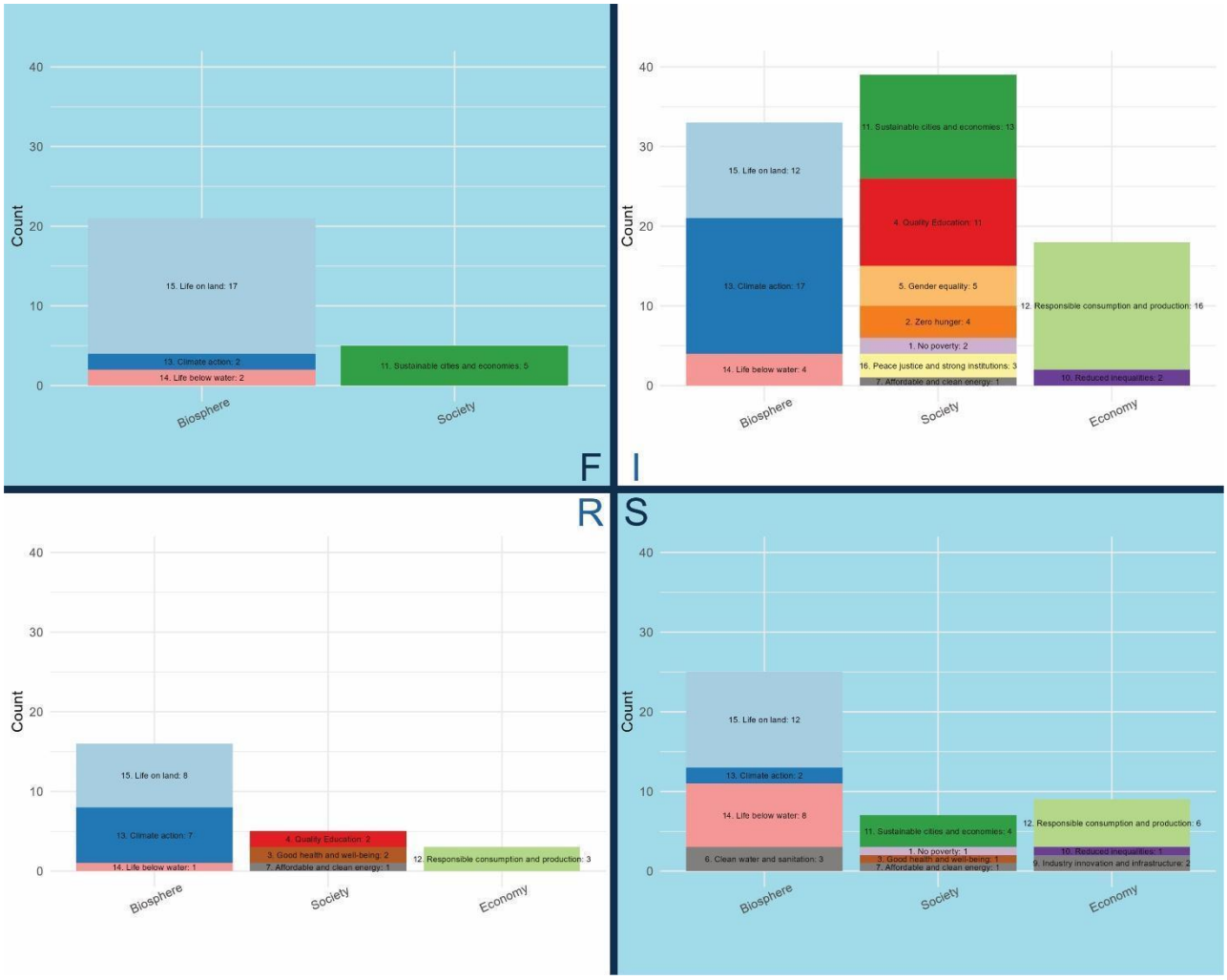


Figure 6: Sustainable development goals of activities for Finland (F), Italy (I), Romania (R) and Slovenia (S).

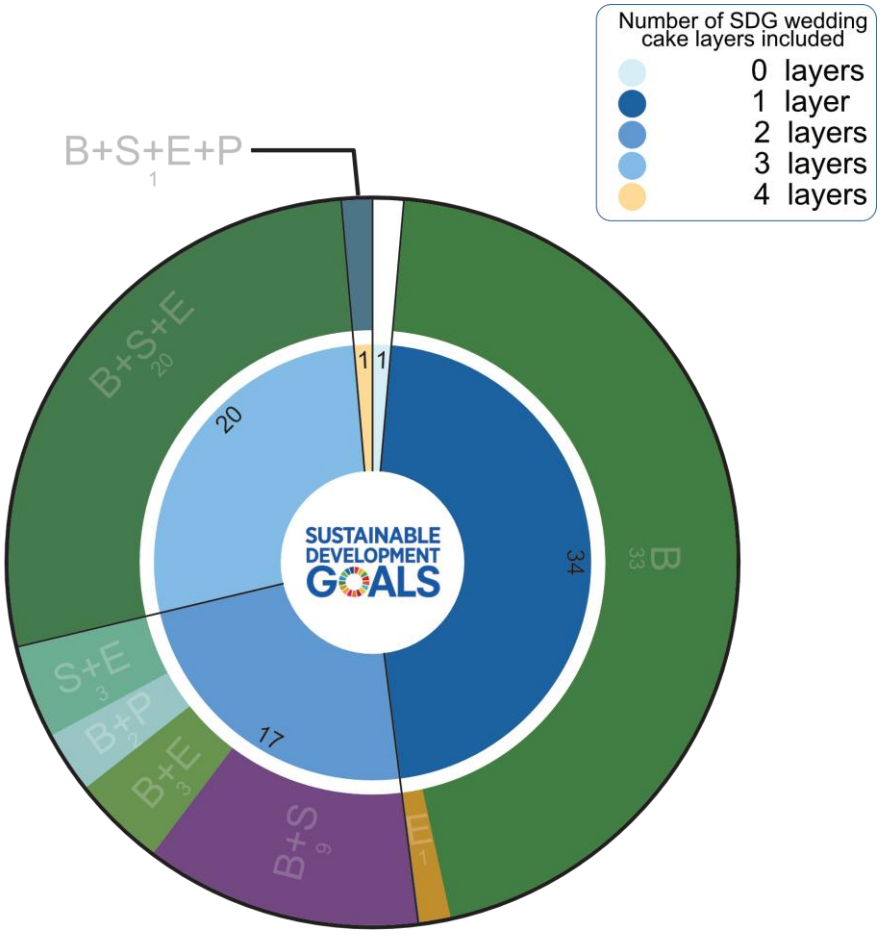


Figure 7: Number of SDG wedding cake layers included in the activities (B - biosphere, S - society, E - economy in P - partnership)

3.5 Subject areas

Reported activities most often integrated science and arts, with limited representation of mathematics, technology, and engineering (Figure 8). Engineering-related content was notably absent in Finland. Expanding into STEM fields would strengthen holistic sustainability education.

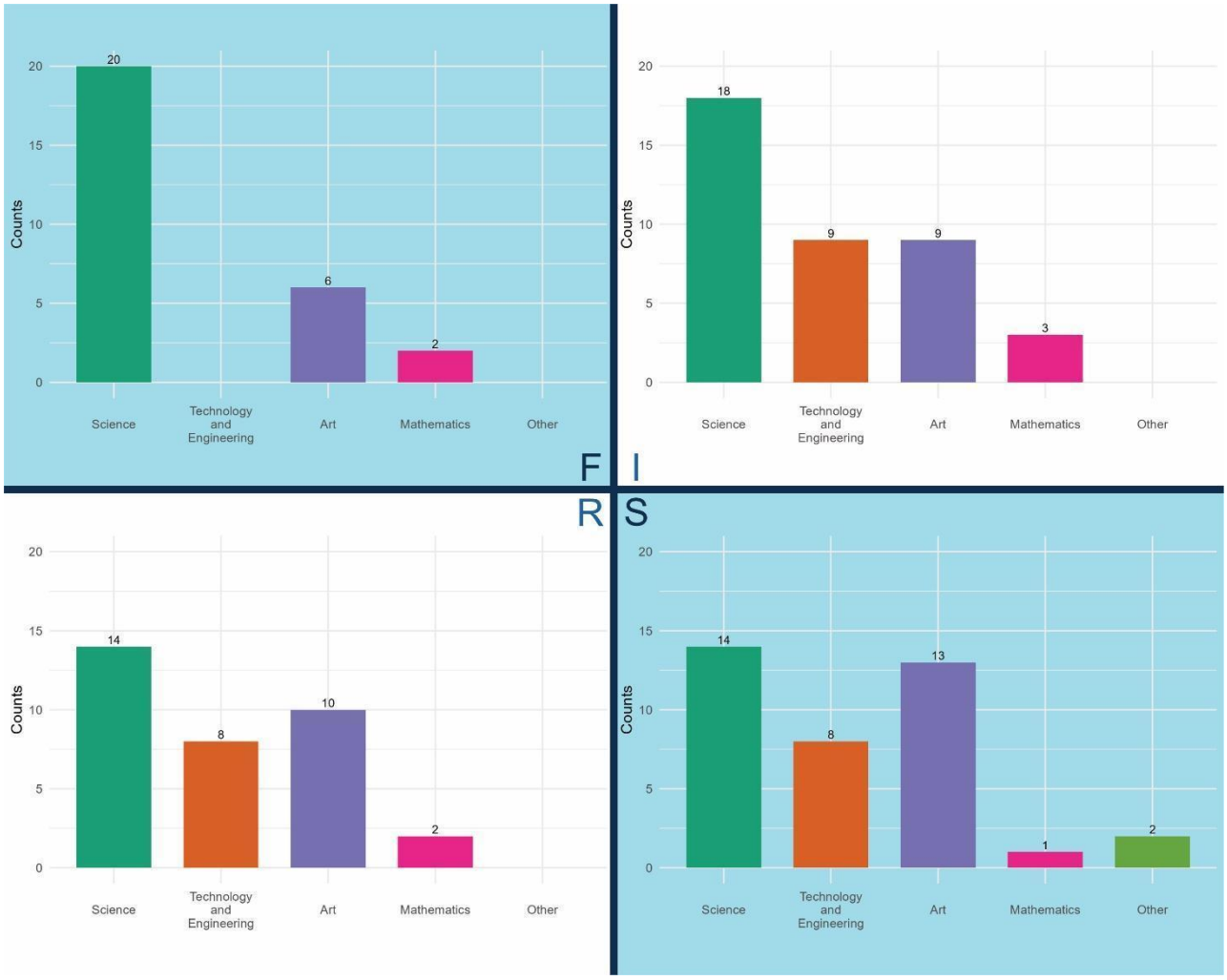


Figure 8: STEAM areas included in the activities for Finland (F), Italy (I), Romania (R) and Slovenia (S).

3.6 Learning objectives

Cognitive objectives varied: Creating was most frequent in Slovenia, Applying in Finland and Romania, and Understanding in Italy. Emotional and psychomotor objectives were harder to assess, though Responding and Valuing were most common. Further refinement is needed to better capture these dimensions in future analyses.

3.7 Recommendations for educators

The findings highlight both the diversity and gaps in sustainability teaching practices. The next phase of the project should focus on:

- Expanding to upper secondary and teacher training contexts.
- Addressing underrepresented GreenComp competences (e.g., Futures literacy, Systems thinking).

- Strengthening integration of economic SDG dimensions and STEM fields.
- Refining methods to assess affective and psychomotor learning outcomes.

Chapter Summary

This chapter analyzes sustainability teaching practices across Finland, Italy, Romania, and Slovenia. Most activities involved small to medium groups of primary and lower secondary students, with upper secondary and teacher training underrepresented. While sessions were usually single lessons, Finland and Slovenia favored outdoor or mixed environments, contrasting with the indoor focus in Italy and Romania.
GreenComp analysis showed strong emphasis on values and complexity, though Futures literacy and Political agency remain underdeveloped. SDG alignment was strongest with biosphere goals, with limited integration of the economic dimension. Subject areas were dominated by science and arts, while engineering and other STEM fields were less represented. Learning objectives highlighted cognitive outcomes, but affective and psychomotor dimensions were harder to capture.
The findings underline the need to broaden teaching contexts, address missing competences, strengthen SDG integration across all dimensions, and expand into STEM education, while refining assessment of non-cognitive learning.

4 GreenComp supported with case studies

Chapter Objectives

- Present a selection of case studies from Finland, Italy, Romania and Slovenia.
- Highlight what is particularly beneficial in selected cases for education for sustainable development.
- Highlight examples how selected cases could be further developed to support GreenComp framework.
- Provide recommendations for educators to improve the effectiveness and inclusiveness of sustainability education.

4.1 Activity 1: Water connects us

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability**, 2.1 Systems thinking **1.2 Supporting fairness,** **2.2 Critical thinking,** 1.3 Promoting nature 2.3 Problem framing 3.1 Futures literacy **4.1 Political agency,** 3.2 Adaptability **4.2 Collective action** **3.3 Exploratory thinking,** 4.3 Individual initiative

Country	Author	School
	Alenka Degen	Primary School Šmartno pod Šmarno Goro

Key points

- Exploring and preserving the cultural heritage of the local place.
- Central theme: water and its importance
- Student research on traditional elements: mills, bridges, fountains, sawmills
- Creation of posters, models, artwork, and short films to present findings
- Raising awareness of clean drinking water as a vital but undervalued resource
- Linking environmental responsibility with cultural history
- Culmination in a public round table event with guest speakers, student presentations, cultural program and an exhibition of student work.
- Ongoing student–teacher collaboration and constructive feedbackSome students receiving excellent grades for their research efforts

4.1.1 Required materials

No material needed.

4.1.2 Step-by-step

1 **Pre-activity preparation**

Conceptualising the project for the entire school.

Integrating the theme into the school's yearly work plan.

Discussing with external guests the possibility of participating in the final round table.

Presenting the general theme "Water Connects Us" to teachers and school management.

Suggesting possible ideas for classroom work with students.

2 **Student Involvement**

Guiding students in researching and creating projects together with teachers on the given theme "Whater connects us".




Preparing a cultural programme for the public round table on a given theme with a group of students (presenters, choir, etc.).


3 **Exhibition Preparation**

Designing and setting up a rich exhibition in the school lobby.



4 Organisation of the Public Event

Public Round Table: Holding a discussion and displaying old photographs on the cultural heritage of bridges, mills, sawmills, stables, etc. in the local area, with external guests (e.g. cultural heritage expert, local beekeeper…).


Student Presentations: Presenting research on cultural heritage related to water through posters, models, and short films.

Cultural Programme: Performing folk songs on the theme of water by the school choir.

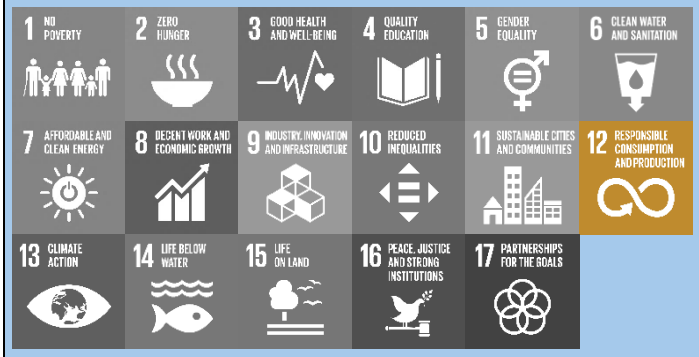
Closing: Visiting the exhibition together with external visitors and toasting with water in paper cups.

4.1.3 Sources

Kunaver, D. (1997). *Čar vode v slovenskem ljudskem izročilu*. Radovljica: TOP Regionalni izobraževalni center.

Šilc, J. (2001). *Zgodovina župnije Šmartno pod Šmarno goro*. Šmartno pod Šmarno goro: Župnijski urad.

4.2 Activity 2: ECO-fashion show

Sustainable development goals	GreenComp
	1.1 Valuing sustainability, 1.2 Supporting fairness, 1.3 Promoting nature 2.1 Systems thinking 2.2 Critical thinking, 2.3 Problem framing 3.1 Futures literacy 3.2 Adaptability 3.3 Exploratory thinking, 4.1 Political agency, **4.2 Collective action** **4.3 Individual initiative**

Country	Author	School
	Jana Štojs	Primary School Litija

Key points

- Process by week: collecting → sketching → sewing → script preparation → fashion show.
- Students create new clothes and accessories from old clothes.
- Steps: collecting clothes, designing, redesigning, preparing and performing the fashion show.
- Example of alterations of clothes in the activity: T-shirt → handbag, trousers → shorts, adding patches.
- Objectives: reduce pollution, waste and consumption; promote sustainable fashion.
- Fashion show carried out at a cultural day and an event for retired school staff.

4.2.1 Required materials

- scissors,
- needles and thread,
- glue,
- sewing machine,
- buttons.
- glitter.

4.2.2 Step-by-step

1 Clothing and footwear collection

Students bring in old clothes and shoes that they no longer use.
The collected material forms the basis for further work.

2 Planning and sketching ideas

Pupils plan the transformation of the clothes.
They sketch their ideas for new clothes and accessories.

3 Redesigning and sewing

Pupils remake clothes with the help of the teacher/mentor.

4 Script preparation and rehearsal

Together they design a script for a fashion show (sequence of performances, music, accompanying words).

5 Performing a fashion show

Students present their recycled clothes and accessories at the school's Cultural Day celebration. They explain the importance of reusing materials, such as textile fibers.
They also repeat the show at an event for retired school staff.

4.2.3 Sources

https://video.arnes.si/watch/62bq73gxtm14

4.3 Activity 3: Discovering the small world

Sustainable development goals	GreenComp
	1.1 Valuing sustainability, 1.2 Supporting fairness, **1.3 Promoting nature** 3.1 Futures literacy 3.2 Adaptability 3.3 Exploratory thinking, 2.1 Systems thinking 2.2 Critical thinking, 2.3 Problem framing 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Gašper Teran, Ksenija Pfeifer	Primary School Elvira Vatovec Prade

Key points

- Students investigate the structure of small animals with magnifying glass, a binocular loupe and a microscope.
- They observe slides, wetland specimens and the structures of larger animals.
- They express their knowledge through artwork with detailed natural history drawings.
- Objectives: to develop scientific literacy, motivation, observation and artistic skills.
- Pupils receive ongoing oral feedback.

4.3.1 Required materials

4.3.2 identification keys for wetland fauna and flora.

4.3.3 stereo binocular loupe,

4.3.4 magnifying glasses and microscope.

4.3.5 Step-by-step

1 Introduction and motivation

The teacher introduces the purpose of the activity: to explore the hidden structures of animals and plants in natural materials.

The teacher emphasises the importance of observation in science and the link with art.

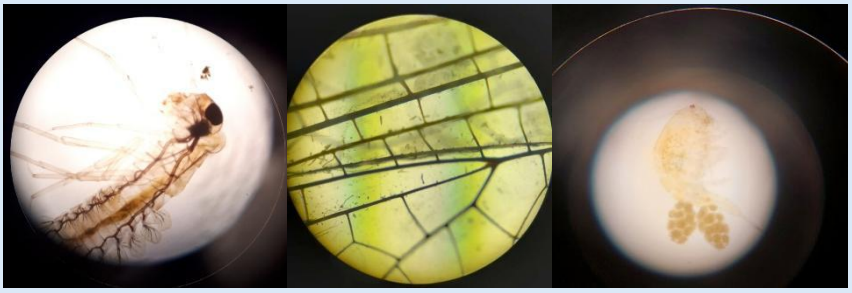
2 Collection and preparation of samples

Students observe the prepared slides and the samples from the wetland (e.g. small animals, plants).

They are introduced to identification keys for species identification.

3 Observation with magnifying lenses

Pupils use magnifying glasses, stereo magnifiers and microscopes.



They investigate the structure of small animals and larger animal parts.

4 Record observations

Students make short notes and sketches of basic structures of organisms (e.g. body shape, limbs, body parts).

5 Creating art

Students make detailed natural history drawings based on their observations.

The emphasis is on accuracy and representation of structure (not aesthetics, but scientific accuracy).


6 Feedback

The teacher gives ongoing verbal guidance and praise during the creation process.

After the work is finished, he/she gives feedback on the accuracy of the observation and drawing.

7 Conclusion and discussion

Students present their drawings.

Together they discuss what they have observed, how they have used the identification keys and how observation has helped them to understand the structure of the animal.

4.3.6 Sources

/

4.4 Activity 4: Photohunt

Sustainable development goals	GreenComp
	1.1 Valuing sustainability, 1.2 Supporting fairness, **1.3 Promoting nature** 3.1 Futures literacy 3.2 Adaptability 3.3 Exploratory thinking, 2.1 Systems thinking 2.2 Critical thinking, 2.3 Problem framing 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Eva Puhar	CŠOD Burja

Key points

- Activity: several sessions in one week (photography, observation, nature exploration).
- Students learn about camera/phone functions, develop selective attention, identify birds using identification keys.
- Educational aspect: respect for nature, rules of behaviour in the National Park.
- Locations: Sečovlje salt farm, Strunjan
- Preparation: appropriate equipment, tools (cameras, binoculars, telephones).
- Processing and presentation of photographs using computer, literature and videos.
- Feedback on an ongoing basis, without evaluation.

4.4.1 Required materials

- Cameras or tablets or phones,
- computers,
- literature.

4.4.2 Step-by-step

1 Preparing for the activity

The teacher discusses with the pupils the rules of behaviour in nature (e.g. in a landscape park).

Preparation for the hike: appropriate clothing and footwear for the weather, backpack with snacks and drinks.

Preparation of tools: charged phones, cameras, tablets, binoculars.

2 Familiarization with tools

Students learn the basic functions of a camera or phone (framing, focus, light).

The teacher gives practical tips for natural photography.

3 Observing and photographing in nature

Location: e.g. Sečovlje Salt Pans or Strunjan.

Students observe nature closely and take photographs of animals (especially birds), plants and landscapes.

They develop selective attention and a sense of natural detail.

4 Species identification

Use identification keys, books, literature and videos to identify animals (e.g. birds) and plants.

Working in groups, helping each other to identify.

Processing and selection of photographs

Students edit their photographs on computers.

They select the best shots to be presented.

5 Preparing presentations

Groups prepare a short presentation of the selected photos and their findings (e.g. which species they identified, what new things they noticed).

They develop skills in finding and using information.

6 Presentation and reflection

Students present the photographs to their classmates.

Together they discuss their observations and what they have learned about nature and photography.

Teacher and students give ongoing feedback (questions, suggestions for improvement).

4.4.3 Sources

/

4.5 Activity 5: The journey of a migratory bird

Sustainable development goals	GreenComp
	1.1 Valuing sustainability, 1.2 Supporting fairness, **1.3 Promoting nature** 3.1 Futures literacy 3.2 Adaptability 3.3 Exploratory thinking, **2.1 Systems thinking** 2.2 Critical thinking, 2.3 Problem framing 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Pia Lindström	Porvoo nature school

Key points

- Focus on empathy and understanding of migratory birds' lives and challenges
- Central activity: educational game simulating one bird species' migration journey
- Highlighting obstacles faced by birds during migration
- Students role-played as migratory birds through imaginative and reflective activities
- Use of task cards and group collaboration to guide the experience
- Emphasis on discussion and evaluation of the migration journey
- Project concluded with reflection and group sharing of insights and connections

4.5.1 Required materials

- Task cards

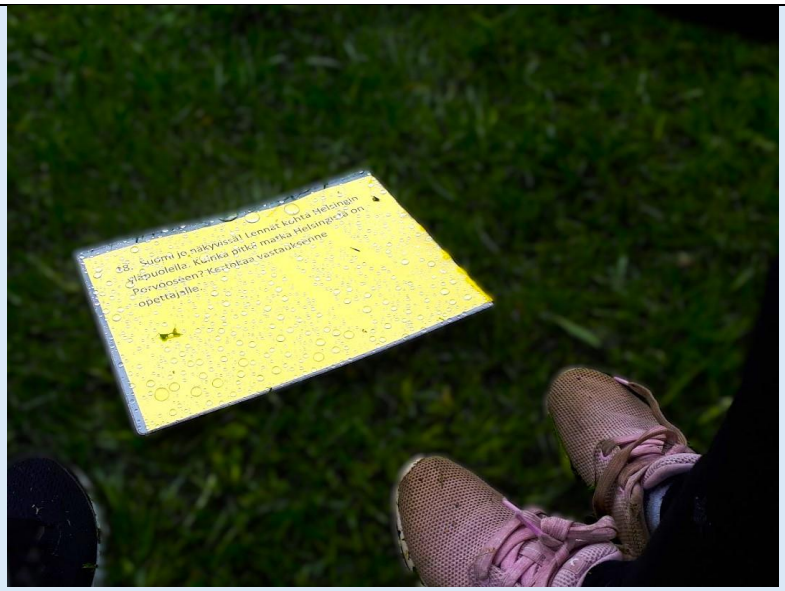
4.5.2 Step-by-step

1 Preparation by teacher

Print and number task cards in advance.

Place them around the schoolyard or natural area (on the ground, in bushes, trees).

Prepare an introduction about the pied flycatcher (picture + key facts).



Some facts about the European pied flycatcher (*Ficedula hypoleuca*)

- The male has a black back and crown, and a white underside. The wing has a large, continuous white patch. The female's back is brownish, and the wing patch is smaller.
- The European pied flycatcher is an insectivore that feeds on a wide variety of flying insects and larvae. Insect larvae are an important food source for the chicks.
- The pied flycatcher nests in all kinds of forests, parks, and yards. It is a cavity-nester, so it needs a natural tree cavity or a suitable birdhouse.
- It is a long-distance migrant, wintering in Africa. Migrates at night.

Examples of task cards:

- In March, you changed your plumage, which means you now have new and beautiful feathers. Look for something white (or light-colored) and something black (or dark colored) in nature and show it to your teacher. These are the colors of the male pied flycatcher. Show what you found to the teacher.
- It's time to depart, and you need to take the right direction toward Finland. How many cardinal and intercardinal directions can you name? How can a person use signs from nature to determine cardinal directions if they don't have a compass? Tell your answers to the teacher.
- You've started your journey and are approaching the Sahara, which is the largest desert in the world. Sand is the most demanded natural resource after water. What is sand used for? Give a couple of examples to the teacher.

- After the vast Sahara Desert, you still need to fly 2000 km before reaching Morocco. How many meters are 2000 km? Tell your answer to the teacher.
- The migration journey takes you over a big city. When you landed to rest, you collided with the window of a tall skyscraper. Luckily, you got away with just a scare! Breathe in and out calmly three times before continuing.
- A bird of prey is trying to attack you! Fly faster! What kind of physical features does a bird of prey have? Tell your answer to the teacher.

2 Introduction

Gather students and explain the storyline: “You are pied flycatchers starting your migration from Africa to Finland.”

Show the bird’s picture and share basic info.

European pied flycatchers (*Ficedula hypoleuca*). Photo: Tomi Trilar (ptice.si)

Explain the rules: groups must find task cards in order, complete the tasks, and report answers to the teacher.

3 Group division

Divide students into groups of 3–4.

Stagger the starting times slightly so groups don’t crowd at the same card.

4 Game play

Students search for numbered task cards in order.

At each card, they:

a. Read the task (biology, geography, math, etc.).

b. Perform the activity or answer the question.

c. Return to the teacher to share their answer or demonstrate the action.

Teacher confirms correctness and encourages them before they move on.

Tasks also simulate real migration events (changing plumage, desert crossing, predator attack, city dangers).

5 Physical activity element

Students move around the area while searching, running, or pretending to "fly," adding exercise to the learning process.

6 Ending the journey

The game ends once groups reach Finland (last task card).

Teacher gathers students and leads a short discussion:

- Why do birds migrate such long distances?
- Why do pied flycatchers come to Finland to breed?
- What challenges do they face along the way?

7 Reflection and wrap-up

Students reflect on what they learned about bird migration, geography, and environmental challenges.

Optionally, groups can share which task they found most interesting or surprising.

4.5.3 Sources

/

4.6 Activity 6: Future builders program

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** **1.2 Supporting fairness,** **1.3 Promoting nature** **3.1 Futures literacy** **3.2 Adaptability** 3.3 Exploratory thinking, **2.1 Systems thinking** **2.2 Critical thinking,** 2.3 Problem framing 4.1 Political agency, **4.2 Collective action** **4.3 Individual initiative**

Country	Author	School
	Pia Lindström, Jonas Heikkilä	Porvoo nature school and Åbolands nature school

Key points

- Builder of the future: a person with skills needed to meet climate challenges.
- Future-building skills (symbolized as a hand):
  - Knowledge of nature
  - Interaction
  - Empathy and care
  - Creativity
  - Communication
- Symbolism: the hand = positive actions and hope vs. footprint = negative, passive impact.
- The materials given are for one version of the program. It´s possible to have other activities more suited for the location, group and time available.

4.6.1 Required materials

- Cones to mark the play area (greenhouse effect tag)
- Strings for marking a system of 4x4 squares (communication, interaction)
- Tasks for thanking trees (care, empathy)
- Task cards with various things to find in nature (nature literacy)

4.6.2 Step-by-step

The swamp

The students will work together to find the correct path through a grid, that represents a swamp. The grid can be made of sticks or strings (or can be drawn on gravel). The grid consists of 4x4 (or more) squares. The only one who knows the correct path is the teacher. The task of the group is to find and remember the correct path through the grid and guide each student to the other side. Each student will go through the swamp by listening to and following the instructions of the other students in the group. Only one path is correct, and the group's goal is to get everyone across to the other side of the grid. You can move through the grid by stepping forward, sideways, or diagonally forward, but never backward. If someone steps on the wrong square, they must start over.


Another example of an activity here is also the task, of building a structure out of nature materials. The task is to build a structure out of natural materials, approximately one meter high. On top of the structure, a slightly larger stone or similar object must be held, without supporting the structure with their hands.


4.6.3 Sources

/

4.7 Activity 7: Feel the change

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 1.2 Supporting fairness, **1.3 Promoting nature** **2.1 Systems thinking** **2.2 Critical thinking,** **2.3 Problem framing** 3.1 Futures literacy 3.2 Adaptability **3.3 Exploratory thinking,** 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Luana Silveri	I.I. La Rosa Bianca_Cavalese (TN)

Key points

- Focus on climate change, natural heritage, and environmental sustainability
- Hands-on outdoor learning in local environments to strengthen student–nature connection
- Direct interaction with biodiversity and caretakers of natural resources
- Researchers provided expertise to support meaningful dialogue on environmental issues
- Development of competencies: systems thinking, critical and exploratory thinking, problem framing
- Core values emphasized: sustainability, fairness, and responsibility for nature
- Encouraging active appreciation and protection of the natural environment

4.7.1 Required materials

- Maps (paper version)
- UNESCO report Sustainable tourism
- digital tools for the final event

4.7.2 Step-by-step

1 **Preparatory Activity**

- Holding *Knowing Climate Change*, a one-day workshop in collaboration with experts from the local museum and a systems-thinking/scenario-building specialist.
- Helping students begin understanding what climate is, why it matters, and how it has changed in the local area, using real data.

2 **Trip 1 – Glaciers and Water Resources: What Became of the Marmolada?**

- Leading a two-day trekking excursion with an overnight stay in a mountain hut, reaching the glacier's edge.
- Running a field lab with a glaciologist, focusing on the morphology and dynamics of the southernmost Alpine glacier.
- Exploring water loss due to glacial retreat and researching local and global impacts in the afternoon.
- Screening the documentary *Chasing Ice* in the evening.

3 **Trip 2 – Let It Snow?**

- Snowshoeing to Monte Agnello and introducing the topic of increasingly warm winters and reduced snowfall.
- Imagining possible futures for Val di Fiemme with support from scenario-building experts, considering the valley's reliance on snow tourism.

4 **Trip 3 – Bike and Go!**

- Cycling from Predazzo to Pozza di Fassa.
- Engaging with MUSE experts on CO_2 emissions and sustainable mobility.
- Discussing road-traffic pressures in the valley, especially during peak tourism periods.

5 **Trip 4 – Drift Away: Rafting on the Avisio River**

- Rafting the Avisio with stops to carry out biogeochemical analyses and to understand river morphology and ecosystem health.
- Concluding with a laboratory on hydrogeological risks and nature-based solutions to climate-induced extreme events.

6 **Final Event – 1st Student Climate Science Café**

- Organising and leading the first Student Climate Science Café, with students presenting experiences and reflections.
- Proposing sustainable actions related to daily life, sports, and leisure.
- Hosting the event in both school locations (Cavalese and Predazzo) in two versions—one light and one more interactive—engaging younger students involved in environmental-citizenship projects.
- Holding the event outdoors where possible to encourage public participation.

4.7.3 Sources

Photo credits:

- Von 2015 Michael 2015 - Eigenes Werk, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=121465080
- https://www.trentino.com/it/sport-e-tempo-libero/bici-e-mountain-bike/piste-ciclabili-in-trentino/pista-ciclabile-val-di-fiemme-e-fassa/
- https://www.avisiorafting.it/en/

4.8 Activity 8: Sustainability Game-jam

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 1.2 Supporting fairness, **1.3 Promoting nature** **2.1 Systems thinking** **2.2 Critical thinking,** **2.3 Problem framing** **3.1 Futures literacy** **3.2 Adaptability** **3.3 Exploratory thinking,** 4.1 Political agency, **4.2 Collective action** 4.3 Individual initiative

Country	Author	School
	Luana Silveri	High school Liceo Scientifico Da Vinci -Trento

Key points

- Engage students in sustainability concepts through educational game design, fostering environmental awareness and 21st-century skills (collaboration, creativity, problem-solving).
- Interdisciplinary sequence with expert support; students research sustainability topics, explore game mechanics, and design prototypes.
- From issue mapping to concept development, prototyping, playtesting, and iteration.
- Final showcase where students present games and reflect on sustainability learning and design process.
- Formative (peer feedback, observations), summative (rubric on final game, presentation, reflection), and self-evaluation (journals).

4.8.1 Required materials

- Projector and videos (e.g. UN SDGs)
- Sample games (e.g., Cascadia, Keep Cool, Ecosystems)
- Internet access, fact sheets, infographics, SDG cards
- Reflection worksheet
- Game design templates and Game design canvas templates
- Whiteboard or collaborative digital tools (e.g., Miro, Padlet)
- Recycled cardboard, markers, dice, tokens, glue, scissors
- Laptops/tablets with access to game-design tools (e.g., Scratch, Twine, Gamefroot)
- Peer review forms and Teacher guidance sheets, Feedback sheets, Reflection journals

- Poster presentation templates

4.8.2 Step-by-step

1 Session 1 – Introduction to Sustainability and Game-Based Learning (2h)

Activities

Watch and discuss short video (WWF / UN SDGs).

Play and analyze 1–2 existing environmental games.

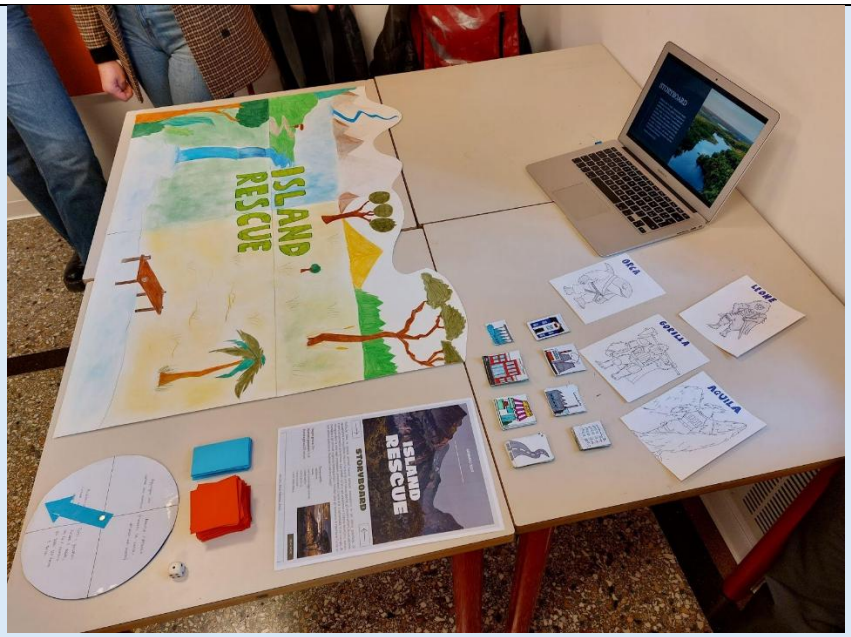
Group discussion: What did these games teach us, and how?

2 Session 2 – Sustainability Topics Exploration (3h)

Guest speaker / video input on key issue (e.g. water footprint, carbon emissions).

Guided group research with curated resources.

Create issue maps showing facts & relationships.



3 Session 3 – Introduction to Game Design (3h)

Presentation on game design principles.

Analyze popular board/digital games for mechanics.

Brainstorm in groups: How can sustainability be gamified?

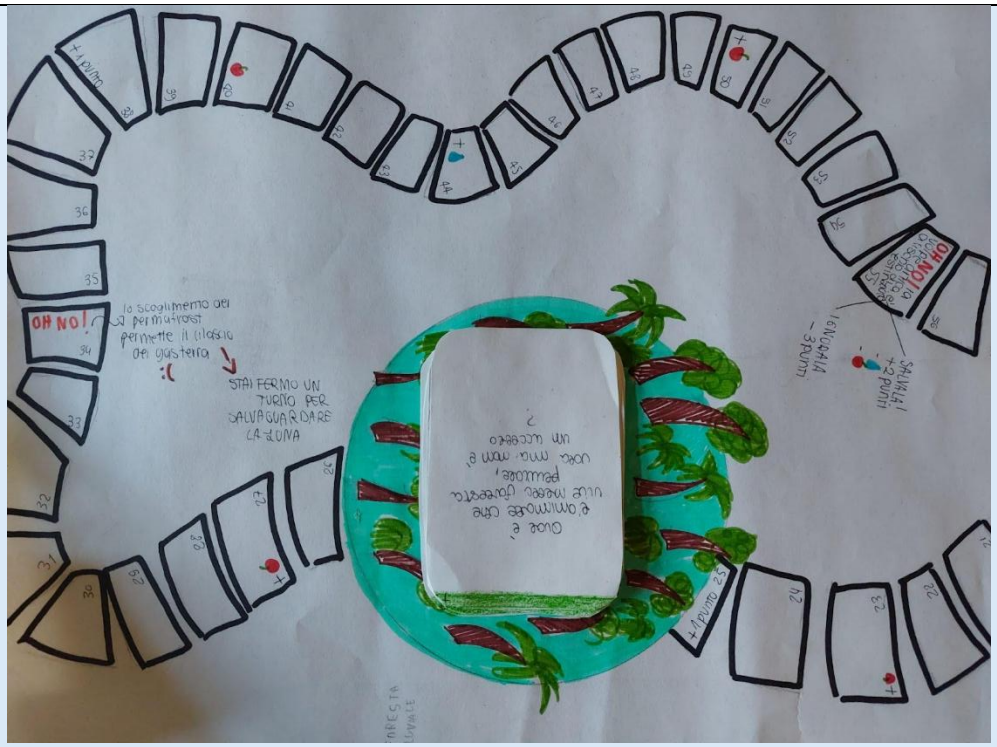
4 Session 4 – Game Concept Development (3h)

Groups choose sustainability issues & define game purpose + audience.

Draft concepts: theme, mechanics, rules, learning outcomes.

Peer feedback & teacher guidance.

5 Session 5 – Prototyping (4h)



Build prototypes (boards, cards, pieces).

Write draft rulebooks.

Internal group testing of core mechanics.

6 Session 6 – Playtesting and Iteration (2h)

Groups playtest each other's games.

Use feedback rubric (gameplay, balance, learning clarity).

Revise rules/components accordingly.

7 Session 7 – Final Presentation and Reflection (3h)

Group presentations: each explains how their game addresses sustainability.

Open play session with peers / visitors.

Reflection discussion: What did you learn about sustainability, design, and collaboration?

4.8.3 Sources

/

4.9 Activity 9: Environments: nature, transformation and sustainability

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 1.2 Supporting fairness, **1.3 Promoting nature** 3.1 Futures literacy 3.2 Adaptability **3.3 Exploratory thinking,** 2.1 Systems thinking **2.2 Critical thinking,** 2.3 Problem framing 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Flaim, Giovannini, Lussana, Perathoner	pre-service teachers/internship - UniBZ+Primary school

Key points

- Raise children's awareness of natural and man-made elements, the concept of landscape, and of environmental issues (climate change, ecosystem fragility, sustainable tourism) through analysis of landscapes in the photos provided by the teacher.
- Favour children' self-reflexion and analitical competences.
- Encourage children' positive attitude towards the environment.
- Build elements for an active future citizenship.
- Feedback on an ongoing basis, without evaluation.

4.9.1 Required materials

Landscapes photos, preferably local.

4.9.2 Step-by-step

1 Step 1 – Viewing Pictures & Activating Pre-knowledge

Teacher shows children photos of various environments (preferably local).

Guiding questions:

- What is an environment for you?
- What do you notice in these pictures?
- What similarities/differences are there between these places?

Children respond freely, expressing their existing knowledge and assumptions.

2 Step 2 – Classification of Environments

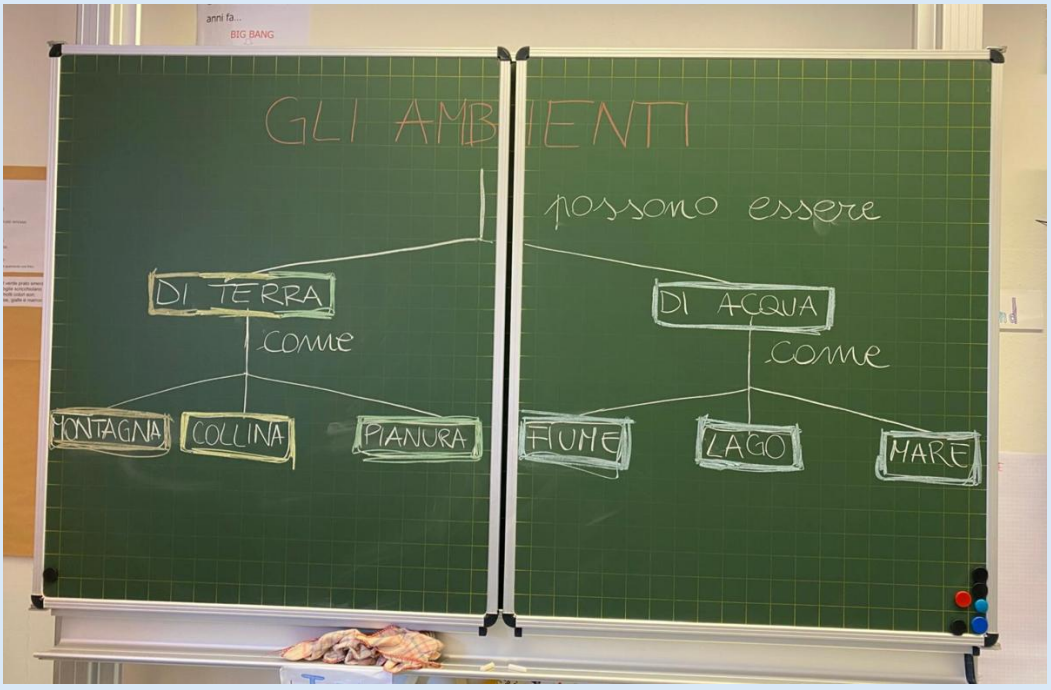
From discussion, six environments emerge: mountain, hill, plain, river, lake, sea.

Together, group them into land and water categories.

Teacher creates a concept map on the blackboard:

- Land → mountain, hill, plain
- Water → river, lake, sea

Children copy the map into their notebooks; teacher attaches example photos for each environment.



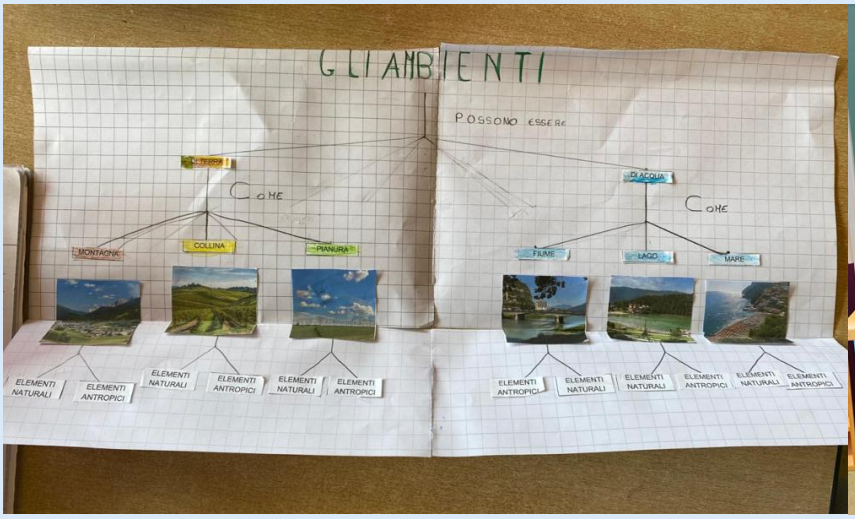
3 Step 3 – Identifying Natural vs. Anthropogenic Elements

Re-examine the photos shown earlier.

For each environment, identify:

- Natural elements (e.g., mountains, rivers, forests, fish).
- Anthropogenic elements (e.g., houses, roads, bridges, boats).

Discuss how both types of elements coexist in the same environment.



4 Step 4 – Human Interventions & Sustainability Discussion

Guiding questions:

- Who lives in these environments?
- What does man build?
- How does the environment change when man intervenes?

Shift focus to sustainability:

- Which interventions cause the most harm near us?
- How can we take care of these environments?
- What should we avoid?
- What positive behaviors can we adopt?

Conclude with shared reflection on sustainable actions in children's daily lives.

4.9.3 Sources

/

4.10Activity 10: Imaginary trip to Antarctica with Carlos

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 1.2 Supporting fairness, **1.3 Promoting nature** 3.1 Futures literacy 3.2 Adaptability **3.3 Exploratory thinking,** 2.1 Systems thinking 2.2 Critical thinking, **2.3 Problem framing** 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Flaim, Giovannini, Lussana, Perathoner	pre-service teachers/internship – UniBZ for primary school

Key points

- Raise children's awareness of environmental issues (climate change, ecosystem fragility, sustainable tourism) through an engaging narrative and creative expression.
- Guided viewing of an Antarctic documentary with Carlos (imaginary character) as a bridge between reality and fantasy.
- Collective discussion, group storyboard creation (alternative/continuation of Carlos' adventures), oral presentations, and individual reflection diaries.
- Formative observation, narrative evaluation (diaries, oral work), peer feedback; teachers collect insights from student behaviors and reflections.
- Integrates environmental, visual, and narrative education; fosters critical thinking, creativity, cooperation, intercultural dialogue, and active citizenship.

4.10.1Required materials

- Interactive whiteboard (IWB) or projector
- Copy of the film/documentary
- Paper, colors, recycled materials
- Markers, scissors, glue
- Optional access to PCs or tablets

4.10.2Step-by-step

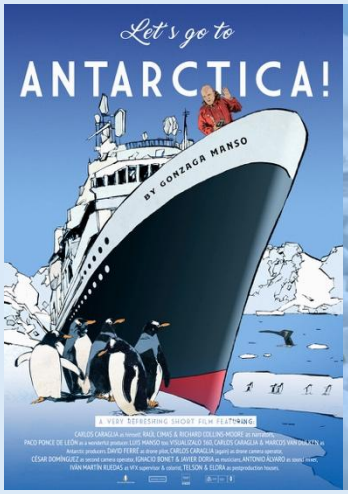
1 Step 1 – Guided Documentary Viewing (10–15 min)

Show a short documentary about Antarctica (with protagonist Carlos).

Pause strategically to:

- Encourage spontaneous observations.
- Stimulate questions.
- Share first impressions.

Aim: build shared attention and create an emotional connection with the narrative.



2 Step 2 – Collective Discussion

After viewing, hold an open class discussion.

Children share emotions, comment on landscapes, and reflect on the message.

Use guiding questions:

- What surprised you the most?
- How is Antarctica different from where we live?
- Why is it important to protect such environments?

Teacher links their ideas to broader environmental themes.




3 Step 3 – Creative Storyboarding (Group Work)

Divide children into small groups.

Each group creates a storyboard imagining:

- An alternative ending to Carlos' story, or
- A continuation of his adventures.
- Use drawings + short text to visualize the story.

Aim: foster creativity, teamwork, and divergent thinking.

4 Step 4 – Oral Presentation

Each group presents its storyboard to the class.

Children explain:

- Their narrative choices.
- How their story reflects ecological reflections or sustainable behaviors.

Aim: practice oral expression, argumentation, and respect for others' ideas.

5 Step 5 – Individual Reflection Diary

Each child writes/draws one page in their personal diary.

Focus:

- Recount the experience.
- Express emotions and thoughts.
- Answer the guiding question: “What can I do to protect Antarctica and our planet?”

Aim: consolidate learning and encourage personal engagement.

Educational Objectives and Value

- Environmental education: understand fragility of ecosystems (Antarctica as symbol).
- Visual education: interpreting and reworking visual narratives.
- Creativity & imagination: storyboarding alternative scenarios.
- Critical thinking & citizenship: linking personal behavior with global sustainability.
- Multisensory learning: visual, linguistic, spatial, and naturalistic intelligences engaged.

4.10.3Sources

Video link: https://share.google/EGs8Jbv7TJHhoOpEz (in Spanish)

https://gonzagamanso.com/en/antartida/ (in English)

4.11 Activity 11: Waterways

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 2.1 Systems thinking 1.2 Supporting fairness, **2.2 Critical thinking,** **1.3 Promoting nature** **2.3 Problem framing** 3.1 Futures literacy 4.1 Political agency, **3.2 Adaptability** 4.2 Collective action **3.3 Exploratory thinking,** **4.3 Individual initiative**

Country	Author	School
	Chiara Scalfi	Non formal education - PNAB

Key points

- Trentino Salute – non-formal outdoor education to promote healthy, sustainable lifestyles.
- Half-day family outing in Campodenno with geocaching via smartphones/apps.
- Water, agricultural biodiversity, large carnivores, food education, cultural and historical aspects.
- Stimulate critical thinking about environment–human relations, foster observation, cooperation, communication, and intercultural dialogue.
- Easy hike on Cammino Jacopeo d'Anaunia with six app-guided stops (environmental and cultural insights, e.g., irrigation canals, Hermitage, local history).

4.11.1 Required materials

- Smartphone e application: Trentinosalute

4.11.2 Step-by-step

1 Step 1 – Introduction

Meet at the trailhead.

Teacher/guide explains:

- What the Cammino Jacopeo d'Anaunia is (ancient pilgrimage route).
- Goals of the hike: discover history, culture, water systems, and enjoy nature.

Check that everyone has the app installed to access the audio information.

2 Step 2 – Begin the Hike

Start walking along the marked section of the route.

Encourage participants to observe landscapes and natural elements along the way.

3 Step 3 – Stop 1: Ancient Church of San Pancrazio

Learn about the history of the church and its role in the valley's culture.

Reflection: Why were pilgrimage routes important for communities?

4 Step 4 – Stop 2: Irrigation Canals

Explanation of ancient water management and canals for crop irrigation.

Connection to sustainability: How do we use water today compared to the past?

5 Step 5 – Stop 3: Origin of the Name "Lover"

Listen to local history and etymology through the app.

Small group discussion: Why do place names matter for cultural identity?

6 Step 6 – Stop 4: Hermitage History

Discover the story of the Hermitage, its spiritual meaning, and connection to the land.

Reflection: What role did such places play in people's lives?

7 Step 7 – Stop 5: Nature Immersion

Pause to enjoy breathtaking views of the Non Valley.

Invite quiet observation (sounds, scents, sights).

Quick activity: List three natural elements you notice here that you don't see at home.

8 Step 8 – Stop 6: Cultural & Environmental Integration

Through the app, learn how nature and culture have shaped each other in this valley.

Teacher/guide links ancient practices with modern sustainability challenges.

9 Step 9 – Conclusion

Arrive at the endpoint.

Group reflection:

- What did you learn about the connection between nature, culture, and sustainability?

- Which stop impressed you the most, and why?

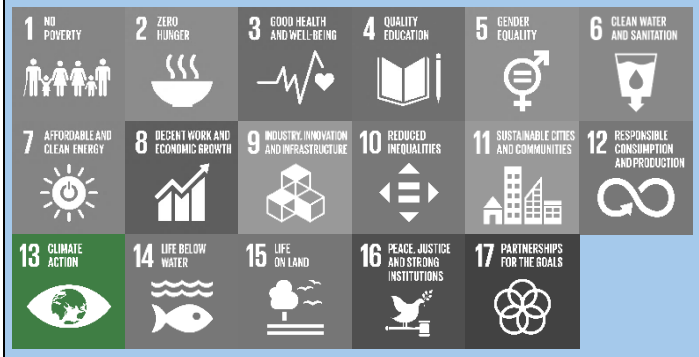
4.11.3Sources

Trentinosalute+ app, downloadable obline, which shows the route "Le vie dell'acqua" (The Waterways)

.*https://youtu.be/UT0LHbT0r6k?list=PLkvwdtTEhOkv7_gh8lWUjLISSp4lo35wU*

https://trentinosalutedigitale.com/blog/portfolio/trentinosalute/

4.12 Activity 12: Art for Earth

Sustainable development goals	GreenComp
	1.1 Valuing sustainability, 1.2 Supporting fairness, **1.3 Promoting nature** 3.1 Futures literacy 3.2 Adaptability 3.3 Exploratory thinking, 2.1 Systems thinking 2.2 Critical thinking, **2.3 Problem framing** 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Ceapsa Iuliana	Liceul de Arte Plastice Timișoara

Key points

- Integration of artistic expression with environmental responsibility.
- Creativity workshops promoting reuse of materials and eco-friendly art practices.
- Activities: drawing, photography, painting on recycled bottles/jars, 3D cardboard cube messages.
- Study and analysis of eco-conscious artists (Agnes Denes, Andy Goldsworthy, Richard Long).
- Deepening awareness of sustainable art and its ecological impact.
- Culmination in a “Green Week” exhibition showcasing student artworks and messages.

4.12.1 Required materials

No material needed.

4.12.2 Step-by-step

1 **Activity 1 – Photography: A Way to the Confluence of Art, Science, and Technology**

- Debating with students on responsible water use (reduction, reuse, recycling) and environmental protection.
- Documenting through photography the resistance of plants adapting to the current environment.

- Exploring contrasts between natural and artificial elements, working on the border between fiction and reality.
- Searching for sustainability issues through artistic photographic expression.

2 **Activity 2 – Reducing Waste by Reusing Materials (Creative Recycling)**

- Reusing jars, bottles, and old objects to create new plastic and glass-based works.
- Transforming glass objects from classic use into interior decoration items.
- Painting and decorating jars with textile materials, converting them into lighting or decorative objects.
- Personalising discarded objects and hand-painting them to create new, imaginative pieces with patience and passion.

3 Activity 3 – Painting and Graphics (35 × 50 cm, Acrylic Colours)

- Presenting artists who classically represented nature (Constable, Caspar David Friedrich, Jean-François Millet).
- Presenting modern and contemporary ecological art (e.g., Kurt Jackson's ecological landscapes).

- Encouraging students to develop personal ideas about environmental protection, greening, and measures for sustaining nature.
- Creating plastic compositions using painting and graphic techniques with chromatic contrasts to highlight the theme.
- Developing varied compositions such as:
    - An hourglass showing the transformation of nature.
    - Symbols of sustainability personifying and fighting for greening.
    - Old TV sets transmitting ecological logos in natural landscapes.

4 Activity 4 – 3D Cubes on Environmental Protection

- Constructing cubes from cardboard, liner, watercolours, acrylics, brushes, and coloured pencils.
- Drawing and painting each face of the cube with messages on sustainability and environmental protection.
- Assigning one cube per student, with each face expressing a unique sustainability-related message.

4.12.3Sources

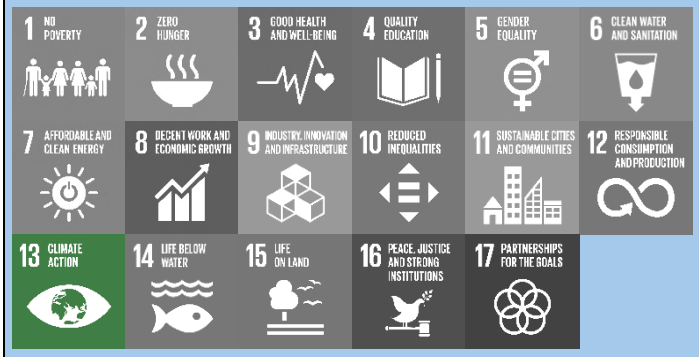
Land art. (n.d.). In *Wikipedia*. Retrieved August 26, 2025, from https://ro.wikipedia.org/wiki/Land_art

Sustenabilitate. (n.d.). In *Wikipedia*. Retrieved August 26, 2025, from https://ro.m.wikipedia.org/wiki/Sustenabilitate

Eco-pastilă de sustenabilitate: Apă – o resursă vitală pentru întreaga planetă [Video]. (n.d.). YouTube. https://www.youtube.com/watch?v=xWd_YGHjWKM

Pastila de sustenabilitate: Apă – o resursă vitală pentru întreaga planetă [Video]. (n.d.). Facebook. https://www.facebook.com/kmg.int/videos/pastila-de-sustenabilitate-apa-o-resurs%C4%83-vital%C4%83-pentru-%C3%AEntreaga-planet%C4%83-/2344952046037376/

4.13 Activity 13: The Recycling Championship

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 1.2 Supporting fairness, 1.3 Promoting nature 2.1 Systems thinking **2.2 Critical thinking,** 2.3 Problem framing 3.1 Futures literacy 3.2 Adaptability 3.3 Exploratory thinking, 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Lavinia Ardelean	”Sfanta Maria” Lower Secondary School No7 Timisoara

Key points

- Raise awareness of selective waste collection, focusing on recycling plastic bottles.
- Informational sessions delivered in 19 classes.
- Environmental problems stem from overuse of natural resources; sustainable management is essential.
- Combine theoretical information with practical activities to build ecological behavior.
- Increased student awareness, stronger ecological habits, and improved teamwork/social skills.

4.13.1 Required materials

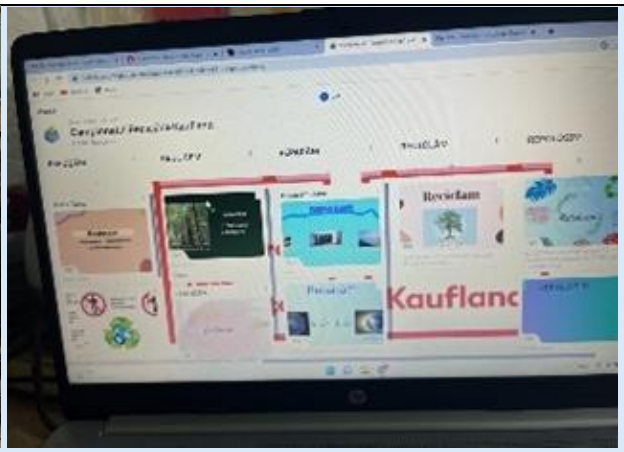
No material needed.

4.13.2 Step-by-step

1 Informational Sessions

Students learned what selective collection means and how recycling, especially plastic recycling, works.

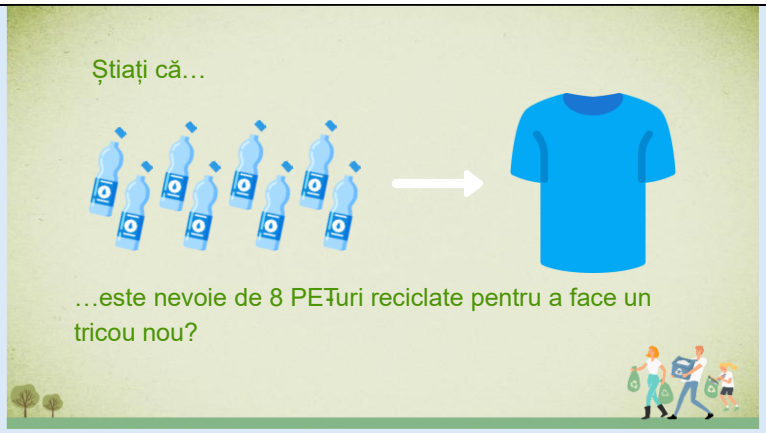
Emphasis on the life cycle of plastic bottles and how proper disposal can reduce pollution.



2 Awareness Building

Sessions encouraged students to reflect on their daily habits.

Highlighted how individual and collective actions can make a difference.



4.13.3Sources

/

4.14Activity 14: Health to go

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 1.2 Supporting fairness, 1.3 Promoting nature 2.1 Systems thinking 2.2 Critical thinking, 2.3 Problem framing 3.1 Futures literacy **3.2 Adaptability** 3.3 Exploratory thinking, 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Lazăr Roxana	Liceul Teoretic „Jean Louis Calderon”

Key points

- Romania has one of the lowest daily fruit/vegetable consumption rates in the EU (25% vs. EU avg. 64%); obesity among adolescents is rising.
- Help primary and middle school students develop healthier eating habits, focusing on daily fruit and vegetable consumption.
- Weekly monitoring tables tracked individual consumption; younger students used drawings, guided by 6th graders.
- 6th-grade students supported younger peers, collected data, and reminded them of healthy eating importance; teacher provided feedback and guidance.
- Informative presentations, daily tracking tables, data analysis/report, promotion of local produce to reduce environmental impact.

4.14.1Required materials

- Informative presentation created by the 6th-grade students
- Tables tracking the students' daily fruit and vegetable consumption
- Computer – for data entry and processing
- Fruits and vegetables – mostly sourced from local producers (thus reducing environmental impact)
- Report/Study resulting from the data collection

4.14.2Step-by-step

1 Step 1 – Launch and Awareness

Teacher introduces the importance of fruit and vegetable consumption.

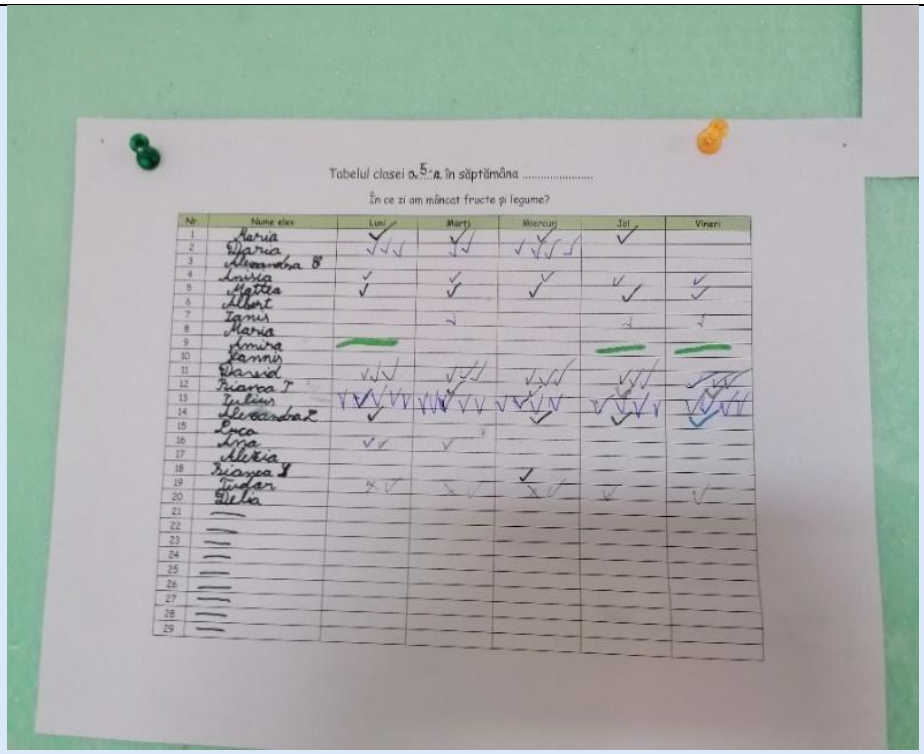
Sixth-grade students prepare an informative presentation about nutrition and health, emphasizing the benefits of locally produced food.

2 Step 2 – Monitoring Table Distribution

Each class receives a weekly monitoring table.

Each student records daily fruit and vegetable consumption (name or drawing).

Younger children (preparatory class) use drawings instead of words to fill in their tables.



3 Step 3 – Weekly Collection and Guidance

Every Monday, 6th graders collect the completed tables and distribute new ones.

They remind classmates about the importance of eating fruits and vegetables.

Teacher supports 6th graders, clarifies questions, and provides specific feedback.

4 Step 4 – Data Entry and Processing

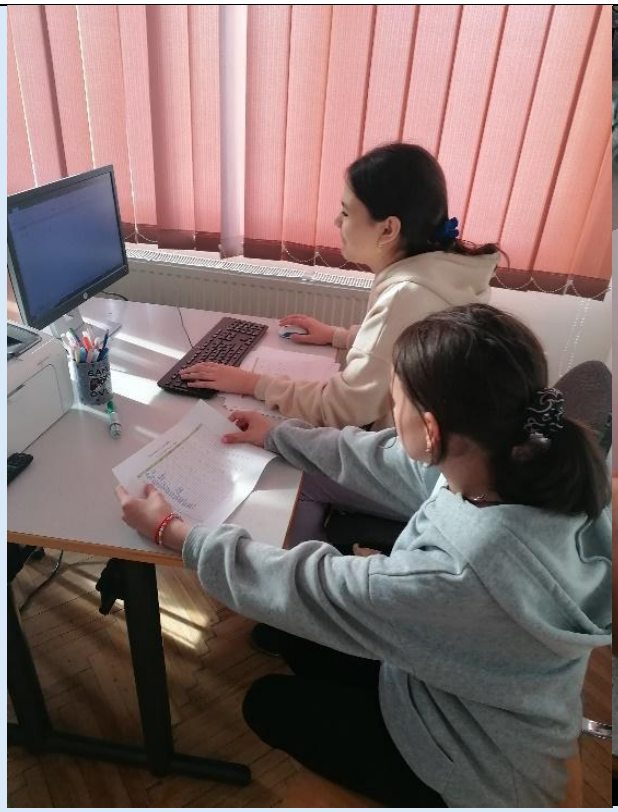
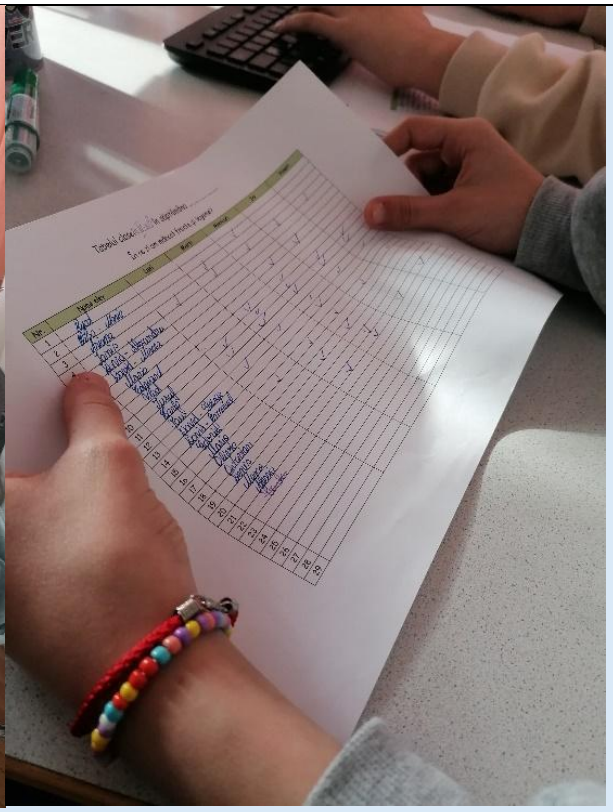
Collected tables are digitized with the help of 6th graders and the teacher.

Data is processed to identify trends in fruit and vegetable consumption.

5 Step 5 – Feedback and Improvement

Teacher and 6th graders discuss progress weekly.

Younger students receive encouragement and suggestions for improvement.

6 Step 6 – Closing Phase

At the end of 2 months, results are summarized in a final report/study.

Students reflect on their personal progress and what they learned about nutrition.

4.14.3Sources

/

4.15 Activity 15: Sustainable Sounds – Exploring Music through Unconventional Instruments

Sustainable development goals	GreenComp
	**1.1 Valuing sustainability,** 1.2 Supporting fairness, 1.3 Promoting nature 2.1 Systems thinking 2.2 Critical thinking, 2.3 Problem framing 3.1 Futures literacy 3.2 Adaptability 3.3 Exploratory thinking, 4.1 Political agency, 4.2 Collective action 4.3 Individual initiative

Country	Author	School
	Ana Maria Rusu Luchian	Scoala Gimnaziala"Anghel Saligny" Focșani

Key points

- Raise awareness of recycling in art, foster care for nature, and develop creativity/rhythmic skills.
- Use unconventional, recyclable instruments (spoons, paper sheets, pens, sticks, body percussion).
- Introduction → rhythmic exploration → group composition → collective performance → reflection.
- Interactive discussion and self-assessment (students share feelings and learning).
- Blends music, creativity, and sustainability education; promotes collaboration, imagination, and ecological awareness.

4.15.1 Required materials

- Spoons
- Baking paper sheets
- Pens
- Wooden sticks
- Body percussion (hands, fingers, feet)

4.15.2 Step-by-step

1 Step 1 – Introduction (10 min)

Teacher leads a discussion on:

- What is sustainability?
- How can recycling be used in art and music?

Show the instruments made from everyday materials.

Emphasize that music does not require expensive equipment — creativity is enough.

2 Step 2 – Rhythmic Exploration (15 min)

Students experiment with sounds of each object.

Practice simple rhythms (e.g., clapping, tapping, scraping).

Compare tones (soft vs. loud, high vs. low).

3 Step 3 – Group Creation (20 min)

Divide students into small groups.

Each group creates a rhythm sequence using given instruments.

Groups combine their rhythms into a collective performance (a class “orchestra”).

4 Step 4 – Reflection and Discussion (10 min)

Open discussion:

- How did it feel to make music from recycled materials?
- What did we learn about creativity and protecting nature?

Encourage students to suggest other everyday objects that could be reused for music.

Feedback & Assessment:

- Interactive discussion: students share their experiences.
- Self-assessment: each student describes what they learned and how they felt.

4.15.3Sources

https://www.youtube.com/watch?v=qRh2crye6cM&t=37s

https://www.youtube.com/watch?v=iV4drYF13-E&list=PLy7E6wHNjwMj6F9QkXb3wEeX-s8f5quhe

https://www.youtube.com/watch?v=XbibjJ1j8To&list=PLy7E6wHNjwMj6F9QkXb3wEeX-s8f5quhe&index=17

https://www.youtube.com/watch?v=AdHj_rQRuTM&list=PLy7E6wHNjwMj6F9QkXb3wEeX-s8f5quhe&index=42

Chapter Summary

The examples of activities illustrate the diversity of approaches to sustainability education in Finland, Italy, Romania, and Slovenia. These case studies demonstrate how sustainability education is implemented across different socio-economic, cultural, and educational contexts in Europe. They also highlight various strategies for developing sustainability competencies. The highlighted case studies collectively address the four competency areas defined in the GreenComp framework: Embodying sustainability values, Embracing Complexity in Sustainability, Envisioning Sustainable Future, and Acting for Sustainability.

For instance, in the activity **"Discovering the Small World"** from Slovenia, students used magnification tools to study animals and expressed their observations through detailed drawings, enhancing both scientific and artistic skills. This activity specifically addresses the competency **"Promoting Nature."**

In **"Journey of a Migratory Bird,"** students role-played a bird's migration journey, exploring the challenges birds face. Through this imaginative and reflective exercise, students developed empathy, collaboration, and critical thinking, targeting specifically the competencies **"Promoting Nature"** and **"Systems Thinking."**

The Romanian activity **"Art for Earth"** engages students in creative expression to explore ecological themes. By reusing materials and studying eco-conscious artists, students develop environmental responsibility while giving visibility to their voices through a public exhibition. This activity emphasizes the competency **"Political Agency."**

In the Italian activity **"Waterways,"** a family-friendly hike combined app-guided geocaching with exploration of water, biodiversity, and local culture. This holistic activity fosters observation, collaboration, and critical reflection, addressing all four competency areas - from **"Valuing Sustainability"** to **"Exploratory Thinking"** and **"Individual Initiatives"**, which are particularly action-oriented.

Four additional examples from Romania - "Art for Earth," "The Recycling Championship," "Health to Go," and "Sustainable Sounds" - highlight the variety of strategies schools use to advance sustainability education during **Green Week**, a dedicated period in the national curriculum, which is also an approach to more holistic integration of the sustainability competencies.

These activities demonstrate how environmental, social, and economic dimensions of sustainability can be integrated in age-appropriate ways. They also showcase a range of methodologies - art, science, competition, peer mentoring, collective creativity etc. - that make sustainability education meaningful for students.

5 References

Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives: Complete edition*. Addison Wesley Longman, Inc.

Bertone, E., Bischeri, C., & Boddy, J. (2024). Integration of the sustainable development goals (SDGs) in architecture curriculum – Quantifying the extent of SDG contributions. *Environmental Education Research*, 120. https://doi.org/10.1080/13504622.2024.2365403

Bianchi, G., Pisiotis, U., & Cabrera Giraldez, M. (2022). *GreenComp: The European sustainability competence framework* (Y. Punie & M. Bacigalupo, Eds.). Publications Office of the European Union. https://doi.org/10.2760/13286

Brooks, J. G., & Brooks, M. G. (1999). *In search of understanding: The case for constructivist classrooms*. ASCD.

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain*. Longman.

Clements, D. H., & Sarama, J. (2021). STEM or STEAM or STREAM? Integrated or interdisciplinary? In C. Cohrssen & S. Garvis (Eds.), *Embedding STEAM in early childhood education and care* (pp. 261–275). Springer International Publishing. https://doi.org/10.1007/978-3-030-65624-9_13

Cugati, N. (2024). Integrating sustainable developmental goals (SDGs) in dental education: An overview. *Journal of Multidisciplinary Dental Research*, *10*(1), 25–30. https://doi.org/10.38138/JMDR/v10i1.24.10

English, L. D. (2016). STEM education K-12: Perspectives on integration. *International Journal of STEM Education*, *3*(1), 3. https://doi.org/10.1186/s40594-016-0036-1

Eurostat. (n.d.). *Key findings—Sustainable development goals—Eurostat*. European Commission. Retrieved January 20, 2025, from https://ec.europa.eu/eurostat/web/sdi/key-findings

Eurostat. (2025). *Draft EU SDG indicators 2025 review report*. European Commission. https://ec.europa.eu/eurostat/documents/276524/20846250/Draft_EU-SDG-indicators_2025-review-report.pdf

Fet, A. M., Knudson, H., & Keitsch, M. (2023). Sustainable development goals and the CapSEM model. In A. M. Fet (Ed.), *Business transitions: A path to sustainability* (pp. 29–34). Springer International Publishing. https://doi.org/10.1007/978-3-031-22245-0_3

Freire, P. (1970). *Pedagogy of the oppressed*. Herder.

Heimlich, J. E., & Ardoin, N. M. (2008). Understanding behavior to understand behavior change: A literature review. *Environmental Education Research, 14*(3), 215–237. https://doi.org/10.1080/13504620802148881

Independent Group of Scientists appointed by the Secretary-General. (2023). *Global sustainable development report 2023: Times of crisis, times of change: Science for accelerating transformations to sustainable development*. United Nations.

Khine, M. S. (2019). *STEAM education: Theory and practice*. Springer. https://doi.org/10.1007/978-3-030-04003-1

Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into Practice*, *41*(4), 212–218. https://doi.org/10.1207/s15430421tip4104_2

Llewellyn, D. (2013). *Teaching high school science through inquiry and argumentation* (2nd ed.). Corwin.

McComas, W. F. (2014). STEM: Science, technology, engineering, and mathematics. In W. F. McComas (Ed.), *The language of science education* (pp. 102–103). SensePublishers. https://doi.org/10.1007/978-94-6209-497-0_92

Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. Jossey-Bass.

New PISA results on creative thinking: Can students think outside the box? (2024). *PISA in Focus*, *125*. https://doi.org/10.1787/b3a46696-en

Nowbuth, A. A., & Parmar, V. S. (2024). Integrating SDGs, One Health, and transdisciplinarity into AMR education strategies. *European Journal of Public Health*, *34*(Supplement_3), ckae144.135. https://doi.org/10.1093/eurpub/ckae144.135

Orr, D.W. (2017). Foreword. V B. Jickling, in S. Sterling, S. (ur.), Post-sustainability and environmental education: Remaking education for the future (str. vii–ix). Springer.

Simpson, E. J. (1972). *The educational and instructional psychology of psychomotor learning*. In *Learning and behavior* (Vol. 1, pp. 164-182). D.C. Heath.

Sterling, S. (2011). Transformative learning and sustainability: Sketching the conceptual ground. *Learning and Teaching in Higher Education, 5*(11), 17–33.

UNESCO. (2014). *Shaping the future we want: UN Decade of Education for Sustainable Development (2005-2014) final report*. UNESCO.

UNESCO. (n.d.). *Sustainable development*. Retrieved January 20, 2025, from https://en.unesco.org/themes/education-sustainable-development/what-isesd/sd

United Nations. (n.d.-a). *The 17 goals | Sustainable development*. Sustainable Development Goals. Retrieved January 20, 2025, from https://sdgs.un.org/goals

United Nations. (n.d.-b). *United Nations Millennium Development Goals*. Retrieved January 20, 2025, from https://www.un.org/millenniumgoals/

United Nations Educational, Scientific and Cultural Organization. (2015). *Global Action Programme on Education for Sustainable Development information folder*. UNESCO Bangkok Office.

Vasquez, J. A. (2013). *STEM lesson essentials, grades 3–8: Integrating science, technology, engineering, and mathematics*. Heinemann.

World Commission on Environment and Development. (1987). *Our common future*. Oxford University Press.