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KA220-SCH-Cooperation partnerships in school education

ECO-FUTURE

MANUAL

Teaching Circular ECOnomy to FUTURE generations

PROJECT CODE: **2022-1-FI01-KA220-SCH-000089395**

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INTRODUCTION TO THE ECO-FUTURE MANUAL

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The Eco-Future Manual belongs to the *Teaching Circular ECOnomy to the FUTURE generations* (ECO-FUTURE) project, a 24-month KA220 SCH-Cooperation partnership in school education. The project involved organisations and schools from Finland, Italy and North Macedonia with the common aim of promoting a successful and supportive scheme for teachers to educate children on the values of the Circular Economy.

In the context of the ECO-FUTURE project, this Manual intends to promote teachers' involvement in Circular Economy issues and sustain their learning path in this field. More specifically, the Manual scope is to provide an upskilling pathway programme for teachers in order to strengthen their knowledge and key competencies with environmental and green issues (in the framework of the GreenComp), Circular Economy and Tinkering Methodology skills through an innovative approach.

The ECO-FUTURE manual constitutes a set of useful resources to convey the results produced by the ECO-FUTURE project, with the aim of fostering Circular Economy education within schools and disseminating - for the purpose of its adoption - the Tinkering methodology.

In the manual you will find the following materials:

- A research report on the state of the art of Circular Economy Education in schools and the use of Tinkering Methodology education in young pupils;
- An introduction to Tinkering Methodology and its use with children;
- A Training Format, based on the GreenComp framework, aimed at training teachers in the use of NFE methods and the Tinkering Methodology to stimulate pupils (6-12 years old) to explore environmental issues, develop a sustainability mentality and eco-responsible citizenship based on creativity.

By promoting this Manual, we strongly believe that with an on-the-field training adapted to contemporary challenges teachers can engage their pupils in a pro-active understanding of the complexity of contemporary phenomena related to the need for a sustainable turnaround in daily living habits.

Also, with the support of the innovative learning methodologies and schemes proposed through this handbook, teachers and pupils are supported in the discovery of environmental issues, engaged in problem-solving, and sustained in developing a sustainability mentality and eco-responsible citizenship.

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RESEARCH REPORT ON CIRCULAR ECONOMY AND TINKERING METHODOLOGY IN SCHOOLS

Content of the Report

This Research Report was created with the aim of collecting and comparing experiences with respect to the topics of Circular Economy, Sustainability and Tinkering methodology adopted in partners' country schools. In the context of the Manual, this chapter is very important in order to understand what the state of the art about the topics we are going to address is.

More specifically, the Research Report aims at presenting the condition of the Circular Economy education in schools and the use of Tinkering Methodology as a resource to foster Circular Economy values to children. In this regard, the report will present a summary of the reports of each individual country, namely: Italy, Republic of North Macedonia and Finland.

Also, the report will show the current level of knowledge and up-skill needs of the project's stakeholders (teachers and pupils 6-12 years old).

What you will find in this report:

- **Desk research (Survey and Best Practices):** in this first part, you will find an introduction to the desk research we conducted both through survey submissions and by best practices collection. All the partners conducted the desk research based on their national situation and reported it to compare the different countries' situations regarding the knowledge of Circular Economy and Tinkering Methodology in the educational field.
- **Focus group results:** partners conducted focus groups with educators in all partner countries. You will find the data collected in this chapter.
- **Assessment:** in this chapter, we will analyse the current situation of the partner countries, trying to understand the real needs of people who are involved in education in terms of Circular Economy and Tinkering Methodology knowledge.
- **Conclusions.**

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SURVEY RESULTS

Introduction

In this first part, we will bring together the research work carried out by the various partners on the situation of the Circular Economy and Tinkering Methodology at the national level in terms of good practices.

More specifically, in the months of February and March 2023, desk research was performed to collect and analyse existing good practices in the field of circular economy and tinkering methodology for the project Teaching Circular ECOnomy to the FUTURE generations – ECO-FUTURE funded by the Erasmus+ Programme of European Commission under the reference number: 2022-1-FI01-KA220-SCH-000089395.

A mixed method research was performed. In this regard, the partners adopted both desk research combined with Best Practices collection and questionnaire administration to the specific target group. The methodology chosen aimed at identifying and mapping the current level of knowledge and up-skill needs of teachers, educators and parents who have children between 6 to 12 ages in the matter of Circular Economy.

Answers and best practices collected at the national level

- **Italy**: a total of 19 stakeholders from Italy filled out the online survey form answering the questionnaire, and 8 Good Practices in the field of Circular Economy and Tinkering methodology were gathered through online desk research.
- **North Macedonia**: a total of 68 stakeholders from North Macedonia filled out the online survey form answering the questionnaire, and 8 Good Practices in the field of circular economy and tinkering methodology were gathered through online desk research.
- **Finland:** a total of 13 stakeholders from Finland filled out the online survey form answering the questionnaire, and 8 Good Practices in the field of Circular Economy and Tinkering methodology were gathered through online desk research.

ITALY

Survey Submission

As stated above, the survey was administered in March 2023 among school teachers and educators who live and work in Italy to provide appropriate activities with the children they work with to develop their awareness regarding CE and tinkering methodology.

The survey was administered via an online form in the Italian language; the target group was reached through email.

Significant data

The opening questions interrogate the age and profession of the respondents. In this regard, according to the 19 answers collected, 7 are 41-51 years old, 6 are between 31-40, 4 are more than 51 and 2 are between 21-30.

Moreover, looking at their professional status, they are 7 educators, 6 teachers, 5 parents with children between 6 and 12 ages and 1 pedagogist.

Circular economy knowledge

To the question: *Do you know the meaning of the expression "circular economy"?* 14 respondents out of 19 claimed yes; 3 answered no; 2 "I don't know". Also, the next question was investigating where their knowledge about circular economy comes from 7 chose "From magazines, TV news, people who surround me"; 6 claimed "From personal interest"; 4 "have never been interested in the subject"; 4 chose "From the school"; 3 has "Undertaken courses about the topic".

When asked about what the best context is to learn content related to the circular economy, the respondents chose school (11), society in general (11), and specific training courses (8).

Circular economy knowledge at the National and professional field level

Coming to the question about the topic's popularity in their country, the participants answered that Circular Economy is not very popular at the national level, as there are some

initiatives, but they are mainly limited to a niche (63.2%). Moreover, the rest of the respondents answered that, at this moment, it is very popular in politics, TV news, the educational system, etc. (21.4%), and 15.8% answered “I don’t know”.

When asked to compare the Italian situation to that of other countries, the majority of respondents (42.1%) chose the option “I think in other countries these principles are disseminated more efficiently through active policies”; the 36.8% claimed “I don’t know” and 21.1% chose the option “I think abroad the situation is the same as in my country”.

The next question asked the respondents to evaluate their knowledge of circular economy in relation to their fieldwork concerning the fieldwork: 15 out of 19 answered “Average. The people I know are aware of something about the topic”; 3 chose “Poor. The people I know are not interested in the topic”.

Moreover, the following question investigated the assessment of knowledge of the circular economy in Italy, and the participants answered, respectively: 9 chose "Poor. The people I know are not interested in the topic"; also, 9 selected "Average. The people I know are aware of something about the topic"; 1 chose "Good. The people I know are well informed on the topic".

Circular Economy in Schools

Moving forward to the question*: “Do you think that the principles and values of the circular economy are satisfactorily conveyed in schools?”* the majority of respondents (16 out of 19) said that educational institutions do not satisfactorily convey this topic. 3, instead, seemed positive about the role of school in this sense (they answered "Yes").

When asked about clarifying how they assess the transmission of the elements of the circular economy within Italian schools, we collected these answers: "I believe that already in the early years of school our children are taught about"; "very little is said about Circular Economy, only in Science hours"; "Not sufficient at all".

Regarding the privileged role of school in conveying Circular economy-related values, 17 people answered that they agree, while 2 out of 13 responded that this teaching must come from other sources such as family, personal interest, society, etc.

In the question, "*In your opinion, how could schools play a role in educating future generations in the values and principles of the circular economy?"* the collected answers are:

“School could explore the topic in more depth during civic education classes”; “Through specific training hours for teachers who will then have to pass on the knowledge to their pupils”; “Talk and disseminate information about the topic also between parents”; “Through training and workshops”; “Through specific training courses”; “By practically engaging the pupils beyond the theoretical notions”.

In this regard, the respondents, when asked which type of content they think schools convey on Circular Economy related topics at the moment, 14 out of 19 answered "Mainly theoretical," and just 5 people chose "Mainly practical (e.g. workshops, events, open days…)". Moreover, the majority claimed that the most appropriate knowledge should be transmitted through practical initiatives, such as workshops, events, open days, etc. They also stressed the importance of involving the children's families in the learning process on this topic.

Regarding the role of teachers in schools in disseminating the Circular Economy values, 16 out of 19 people answered that they should have specific training in circular economy education skills; 1 answered that they do not need it, and 2 “I don’t know”.

8 out of 19 claimed they know what Tinkering and Tinkering Methodology is, while the remaining answered no.

Finally, when asked about what types of skills teachers should deepen and improve in order to be good educators in the field of the circular economy, the respondents wrote: “theoretical and practical knowledge about the topic”; “the values of Circular Economy”; “Circular Economy from both a theoretical point of view and a practical one: they need to be examples for the pupils”; “Teachers should be proactive in class and invite their students to put Circular Economy values into practice”.

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REPUBLIC OF NORTH MACEDONIA

Survey submission

As stated above, the survey answers were collected during the period February-March among school teachers who live and work in North Macedonia in order to provide appropriate activities with the children they work with to develop their awareness regarding CE and tinkering methodology.
The survey was administered via an online form in the Macedonian language; the target group was reached through email.

Significant data

The opening questions interrogate the age and profession of the respondents. To this regard, according to the 64 answers collected, we had respectively: 2 respondents aged 18-25; 2 respondents 26-30; 14 respondents 31-40; 21 respondents 41-50; and >50 years old – 8 respondents.
Moreover, looking at their professional status, we collected 45 answers from teachers, 11 from educators and 8 from parents with children between 6 and 12 years old.

Circular economy knowledge

To the question: *Do you know the meaning of the expression "circular economy"?* 30 of the 64 respondents claimed "yes", then 14 claimed "no", and 20 claimed "not sure". Also, when the next question was investigating their knowledge about circular economy, the 17 answered that this topic comes from "school". Then, the other 21 respondents answered "specialised training (university, training course, etc.)"; 25 respondents answered, "I have never been interested in the subject, but I became aware of it through newspapers, TV news, people who surround me, etc." and 7 respondents answered, "I'm not really into it".

Circular economy knowledge at the National and professional field level

When asked to compare the North Macedonia situation to that of other countries, 7 out of 64 respondents chose the option “at the moment really popular: politics, news, initiatives, education system... are all trying to disseminate values and principles of the Circular Economy with the aim of impacting people’s behaviours”, 42 of respondents chose the option “not really popular. There are some initiatives, but they look more like niches, and for sure they are not sufficient to convey real results on most people’s behaviour,” while the 15 chose: “not sure”.

The next question asked the respondents to evaluate their knowledge of circular economy conservation concerning the economic sector in which they work, so their answers were 41 out of 64 "Average. The people I know are aware of something about the topic. ".14 out of 64 said "poor". The people I know are not interested in the topic"; 8 said "good. The people I know are informed about the topic", and 1 out of 64 said, "Excellent. The people I know are actively engaged in the field".

Moving forward to their opinion of transmitting the principles and values of the Circular Economy within schools, most respondents answered negatively. It claimed "not" transmitted 84,4% to explain the transmission of the principles and values, while 9,4% chose the option "yes" and 6,2% chose the option "I'm not sure".

The survey’s participants agreed on the necessity of training on the values and principles of Circular Economy knowledge in school, and from the offered answers, they also added that answer 1 – "Yes, I think this should be the place par excellence" 43 out of 64 respondent; answer 2: "Not really, I think this kind of knowledge must come from other sources such as family, society or personal interest" 21 out of 64 respondents.

Circular Economy in Schools

In the following section, the respondents agreed on the fact that the school should be a place where future generations can be trained in the values and principles of the Circular Economy and,from the offered answers, suggested that: Answer 1 – “yes, I think this should be the place par excellence”; 45 out of 64 respondents; answer 2: “not really, I think this kind of knowledge must come from other sources such as family, society or personal interest” 19 out of 64 respondents.

The survey's participants explained how schools could play a role in training future generations in the values and principles of the Circular Economy. 64 of the respondents answered: “theoretical and practical workshops in Innovations class and as extracurricular activities.”

The next question was about which kinds of knowledge about Circular Economy are currently transmitted in schools. To this regard, they added: answer 1 – “mostly theoretical” 26 out of 64 respondents; answer 2: “mostly practical” 22 out of 64 respondents; answer 3: “a good mix of both theoretical and practical” 16 out of 64 respondents.

The following question was about other efficient ways to transmit the Circular Economy's values in schools in the respondent's countries. The participants gave short answers such as: "workshops”, “initiatives”, “free student activities”, and “events”.
In the following question, all 64 respondents answered “yes” to: *do you think teachers should have specific training from the point of view of skills in the educational field of the Circular Economy?*

Finally, concerning the question about which types of skills teachers should deepen and improve to be good educators in the field of circular economy, the respondents showed enthusiastic about the educators' role. In this regard, some of them added: answer 1 – "It should organise training that will help teachers better and more effectively transfer their knowledge to students, both theoretically and practically, using modern digital tools. The critical opinion of young people can encourage their inclusion in training, programs such as student exchange in other countries, etc., where they will have the opportunity to meet and acquire additional knowledge on the topic and how it is implemented in society." answer 2: "reduction of consumption rate and waste management"; answer 3: "skills and knowledge about Circular Economy, its role in the life of the individual and society and the way of application in life"; answer 4: "Through training, practical and theoretical training, workshops"; answer 5: "team spirit, struggle, enthusiasm"; answer 6: "promotion of circular economy, information, leadership skills, flexibility, creation and design skills"; answer 7: "to be good educators of the Circular Economy, teachers should show students through theatrical performances, paintings, workshops and more".

Tinkering methodology knowledge

To the question: *Do you know the meaning of the expression "Tinkering methodology"?* 46 out of 64 respondents claimed "No", while 18 claimed "Yes".

FINLAND

Survey results

As stated above, the survey answers were collected during April 2023 among school teachers who live and work in Finland to provide appropriate activities with the children they work with to develop their awareness regarding CE and tinkering methodology.

The survey was administered online in Finnish; the target group was reached through email.

Significant data

The opening questions interrogate the age and profession of the respondents. According to the 13 answers collected, 30.8% of the survey respondents were between the ages of 41 and 50, 30.8% were> 50, 15.4% were between 31-40, and 15,4 % were between 18-30. 61.5% were teachers, and 30.8 % of the respondents were parents of students.

Moreover, looking at their professional status, we collected 13 answers: 9 from teachers, 1 from educators and 3 from parents with children between 6 and 12.

Circular economy knowledge

To the question: *Do you know the meaning of the expression "circular economy"?*, 92.5% of the respondents claimed *yes*. Also, when the next question was investigating their knowledge about the circular economy, 53.8% answered that th*e sources of the principles and values of the circular economy come from* specialised training (university, training course, etc.). Then, the other respondents (23.1%) answered from school.

Circular economy knowledge at the National and professional field level

When asked to compare the Finland situation to that of other countries, 84.6% of respondents chose the option “School”, while 46.2% chose: “Society (TV news, newspaper, people who surround me, etc.) ”, and 30.8% chose: "Specialised training (University, training courses, etc.)".

The next question asked the respondents to evaluate their knowledge of circular economy conservation concerning the economic sector in which they work, so their answers were: 15.4% “Poor. The people I know are not interested in the topic”; 46.2% “Excellent. The people I know Are actively engaged in the field”; 7.7% “Good. The people I know are informed about the topic”; 7.7%“Average. The people I know are aware of something about the topic”.

Moving forward to their opinion of the transmission of the principles and values of Circular Economy within schools, the majority (61.5%) of the respondents answered Yes. It claimed that the principles and values of circular economy are sufficiently conveyed in schools to explain the transmission of the principles and values, while the rest, 23.1%, chose option No.

The next question was about specifying how they evaluate the transmission of Circular Economy elements within a school or not in the respondents' country. The participants (84.6%) answered: "Yes, I think this should be the place par excellence ".

The survey’s participants agreed (84.6%) on the necessity of training on the values and principles of Circular Economy knowledge in school, and they also added that the knowledge should be (30.8%) theoretical (e.g. Classes on the topic), (23.1%), practical (such as workshops, initiatives, events, days dedicated to a specific theme, etc.), or (23.1%) mix of both theoretical and practical.

Circular economy in schools

In the following section, the respondents agreed on the fact that the school should be a place where future generations can be trained in the values and principles of the Circular Economy and suggested that: Answer 1 – Yes, I think this should be the place par

excellence 84,6%; Answer 2: “Not really, I think this kind of knowledge must come from other sources such as family, society or personal interest” 7.7%.

The survey's participants explained how schools could play a role in training future generations in the values and principles of the Circular Economy. Most respondents (84.6%) saw school as a place to obtain education about the circular economy. According to the respondents' experiences, schools provide theoretical knowledge and practical information about the circular economy. In the opinion of the survey participants, practical knowledge about the circular economy should be delivered in schools (46.2%) and a combination of theory and practice (38.5%).

The next question was about which kinds of knowledge you think Circular Economy is currently transmitted in schools; the respondents showed theoretical 7.7%, practical 46.2% or theoretical and practical 38.5% on the educators' role.

In the following questions, the respondents (84.6%) answered yes to the question, "*Do you think teachers should have specific training from the point of view of skills in the educational field of the Circular Economy?*"

Finally, concerning the question about which types of skills you think teachers should deepen and improve to be good educators in the field of circular economy, the respondents showed enthusiasm about the educators' role.

Tinkering methodology knowledge

To the question: *Do you know the meaning of the expression "circular economy"?* 92.3% of the respondents claimed Yes.

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COLLECTION OF BEST PRACTICES

I. Ri-Creazione

ECO-FUTURE– BEST PRACTICES	
Name:	Ri-creazione
When:	2015-ongoing
Where	Tuscany, Italy
Who:	Sei Toscana, Servizi Ecologi Integrati Toscana
Objectives	Through various courses designed for different classes and age levels, the project aims to teach the fundamentals of 4R (Reduction, Reuse, Recycling, Recovery) of waste chain and circular economy. The specific objectives are: • Recognise the different types of waste, learn about the problem of waste, learn how to reduce the amount of waste, and how to do good waste sorting. • Learn about the concept of reuse, gain awareness of the importance of not wasting, and encourage virtuous behaviours against waste. • Raise awareness and reflection on the first action in the 4 R-system- reduction, illustrating good practices for conscious consumption and directing children toward preserving natural resources. • Raise awareness and reflection on the fourth action in the system of the 4 R's hierarchy, i.e., recovery of matter and energy, with insights about the activities to which waste is destined after collection. Actively and concretely empower children about their ecological role at school and in the home. • Offer an overview of sustainability and the 2030 Agenda and cross-cuttingly explore the 17 Sustainable Development Goals by bringing students closer to sustainability concepts. This is paramount: as we are all part of the change, we are all responsible for it. Our actions today will affect the planet of future generations.
Stakeholders of the project:	• Schools • Teachers • Educators • Municipalities

Beneficiaries:	• Students • Families • Communities
Financing:	N/A
Description:	Sei Toscana's environmental education project offers Primary and Secondary schools educational paths to delve into the topic of waste and the materials cycle to encourage the spread of good daily practices at home and at school and reduce the impact of our daily behaviours. The project offers four educational paths to deepen one or more of the "4Rs" of the waste cycle (Reduce, Reuse, Recycle, Recover). The course is addressed to Primary and Secondary schools of the ATO Toscana Sud - provinces of Arezzo, Siena and Grosseto and the Val di Cornia (LI) municipalities. The teacher can choose one of the proposed thematic paths within each group according to their own educational planning.
Results achieved:	The project is now in its eighth year, and for the 2022-2023 school year, more than 9,000 students have signed up for it, with 500 classes and 68 municipalities involved.
Innovation:	The innovation comes from the fact that entities not traditionally used to educate students but which manage the waste chain are collaborating with primary and secondary institutions to offer teachers the knowledge of this system and be able to pass it on to classroom pupils, who in this way gain awareness and spread it to their communities.
Empowerment:	Teachers and pupils are empowered through the acquisition of circular economy knowledge and skills and can decide to change their daily habits about these aspects. They then become active agents of change in practices and mindsets, which they can also pass on to their families and communities.
Website:	https://ri-creazione.it/
Contacts:	Email: scuola@seitoscana.it Phone: 05771799173.
Picture:	Ri-CREAZIONE

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II. Green School

ECO-FUTURE– BEST PRACTICES	
Name:	Green School
When:	March 2019 - ongoing
Where	Italy
Who:	Green-school: rete lombarda per lo sviluppo sostenibile
Objectives	The Green School project involves implementing cooperative action by the entire school community in which pupils, teachers, non-teaching staff and parents act together to reduce the school's carbon footprint. Schools have the task and duty to promote the behavioural and mental change needed to build a more sustainable society. By acting on a daily basis, schools can make it systematic and natural for pupils and the entire school population to adopt virtuous behaviours, thus helping to form citizens who are aware and respectful of the environment and the common good. Green School is based on active learning: every step of the way, knowledge and actions are integrated, ensuring coherence between thinking, studying and acting. It is a process of co-education in which the experience itself generates knowledge and learning. In particular, Green School acts to: • measure schools' carbon footprint; • adopt good practices to reduce schools' environmental impact by working on at least one of the thematic pillars; • calculate the CO2 emissions; • deepen with educational pathways the project's themes • present the participants' experiences to the evaluation committee at the end of the school year; • inform and disseminate in and out of school the path taken and the results achieved.
Stakeholders of the project:	• Children • Teachers • Parents
Beneficiaries:	• Schools • Students • Families • Communities • Municipalities

Financing:	N/A
Description:	Education for sustainable development is gaining more and more importance within school curricula: educating tomorrow's citizens in the implementation of good practices respecting the environment has become a requirement that cannot be renounced. Starting from these premises in 2009, the Green School program was born, then extended to the provincial level with the support of the Province of Varese. Thanks to the lively interest aroused by the program outside the Varese area, the Green School Technical Scientific Committee promoted its dissemination: from 2019 to 2021, the first experimentation at the regional level in Lombardy of the Green School program was carried out thanks to the project "Green School: Lombardia network for sustainable development" that involved more than 400 schools from all Lombardia provinces. From the 2022/23 school year, the Green School program will spread nationwide, thanks to the project "Green School Italia: A Network of Schools and territories for Sustainable Development," which will enable the spread of the Green School method in Valle d'Aosta, Metropolitan City of Rome Capital, Metropolitan City of Cagliari, and Province of Livorno.
Results achieved:	From 2009 to today, the project has involved: • 619 schools; • > 190.000 students; • > 16.000 teachers. The project claims to have contributed to the savings of • 132 tons of CO2 and 2.2 kg of CO2 per every student. The numbers for the year 2022-23 are: • 319 participating schools; • 13 provinces involved; • 12 training events realised.
Innovation:	The project's innovation lies in involving schools in actively reducing their ecological footprint by promoting and disseminating good circular economy practices within institutions. In addition, the project, thanks to the results, has built a vast participatory network involving several provinces in implementing good sustainability practices.

Empowerment:	The empowerment character comes from the fact that the project involves schools and their protagonists- teachers and students- in the implementation of good practices that have a real and positive impact on their ecological footprint. In this way, the school becomes an incubator of good practices that can be passed on from school to school and from generation to generation.
Website:	https://www.green-school.it/pages/metodo-green-school
Contacts:	https://www.green-school.it/pages/contatti
Picture:	

III. Io Riciclo

ECO-FUTURE– BEST PRACTICES	
Name:	Io riciclo
When:	2018
Where:	Modena, Italy
Who:	Scuola dell'infanzia "Boccherini"
Objectives:	- Learning to know, love and respect the environment. - Acquire conscious behaviours of respect for the environmental heritage. - Memorise and internalise behaviours regarding norms and rules of civil and ecological. - Mature attitudes of respect for the environment by limiting waste and contributing to recycling. - Understand the importance of producing less waste.
Stakeholders of the project:	• Schools • Kids • Educators
Beneficiaries:	• Schools • Families • Community
Financing:	• N/A
Description:	The project on recycling stems from the need to ingrain in the culture of the new generations the awareness that the environment is a fundamental good that must be protected. The project aims to propose a new lifestyle to children, enabling them to overcome today's sometimes excessive consumption, which leads us to waste much of what we have. Project activities enhance children's creativity by engaging them in the design and construction of objects with the use of materials from the separate collection of "waste." In particular, the use is made of plastic, paper, Cardboard, leftover cloth, buttons, woollen threads, ribbons, wood, cork scraps, etc. Objects are made that can then be taken home or stored at the school, but, most importantly, they learn to distinguish between waste proper and reusable material. This allows them to attribute to what is normally considered a waste to be disposed of a new value.

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Results achieved:	N/A
Innovation:	The project's innovation lies in making children understand the importance of recycling and the potential of reuse, which are values that can be transmitted culturally. As children learn to reuse some materials usually considered "waste," they learn to recognise the value in the materials that are products of work. Before turning them into waste, they try to value them for playful purposes.
Empowerment:	N/A
Website:	Project factsheet: https://www.ic8modena.edu.it/wp-content/uploads/2018/06/progetto-riciclandino.pdf School website: https://www.ic8modena.edu.it/scuola-dellinfanzia-boccherini/
Contacts:	• moic845006@istruzione.it
Picture:	  

IV. Educational Campaign In Italian Schools On Waste And Circular Economy

ECO-FUTURE– BEST PRACTICES	
Name:	Educational Campaign in Italian Schools on waste and circular economy
When:	09/2017 to 06/2018
Where:	Rome, Italy
Who:	FISE Assoambiente
Objectives:	- promote a more circular approach to waste management, - raise awareness among school-age students that waste can be a powerful resource within a circular economy framework. -
Stakeholders of the project:	• Educators • Schools
Beneficiaries:	• School-age students • Families of the students involved • Educators
Financing:	• N/A
Description:	Everything is transformed - a new look at waste is an educational campaign. It aims to involve students from secondary and primary schools in Italy to promote a more circular approach to waste management. Waste is not always meant to be thrown away and destroyed. It can be sorted and transformed into something else - a different material, object or energy. This is the main message of the book, which is delivered for free to more than 1,000 classes throughout Italy to raise awareness among school-age students that waste can be a powerful resource within a circular economy framework. The campaign was paired with the creativity competition Make a Difference. Students were asked to create an effective slogan to promote waste recycling and then present it in a visually appealing way, preferably using waste materials to highlight the core message louder. The winners of last year's competition created artwork with only recycled materials and the message "saving waste is finding a treasure."

Results achieved:	The 2017-2018 campaign in numbers: • more than 1,000 classes spread throughout Italy • more than 26,000 students were involved, of which 19,000 were from primary and 7,000 from secondary schools • 2,800 students participated in the creativity contest.
Innovation:	The educational campaign has focused students' attention on the importance of a circular economy approach, instilling in them a greater awareness that each action, if taken in the right direction and following the principles of circularity, can result in a wiser use of natural resources.
Empowerment:	Seven people trained and contracted for 10 months, 6,160 total hours of activity, 23 information centres, about 2,000 citizens interviewed and sensitised on the issue of waste separate collection, and over 50,000 people reached on social media.
Website:	https://circulareconomy.europa.eu/platform/en/good-practices/educational-campaign-italian-schools-waste-and-circular-economy
Contacts:	https://www.icesp.it/contact
Picture:	

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V. "Closed-Loop School Recycling" Project

ECO-FUTURE– BEST PRACTICES	
Name:	"CLOSED-LOOP SCHOOL RECYCLING" PROJECT
When:	2017-18
Where:	Italy
Who:	Lavorazione Carta Riciclata Italiana S.r.l.
Objectives:	- The aim of the project is to create a set of tools that support the introduction of the competencies of the circular economy in adult education.
Stakeholders of the project:	- Schools - Recycling Company
Beneficiaries:	• students • Local waste collector company
Financing:	• N/A
Description:	The project in brief: • The school collects paper in the specific containers provided by LCI S.r.l. • The local recycling company collects the material from the containers on a monthly basis and takes it to its authorised warehouse for packaging and storage. • LCI S.r.l. can, therefore, send the different types of material to the UPM paper mills (e.g. to recycle white paper, newspapers, and magazines) and other partner paper mills taking part in the project (e.g. to recycle Cardboard). • These paper mills make it possible to « close the loop », producing new paper with the fibres from the used paper and thereby guaranteeing a huge saving in terms of resources and the consumption of land, preserving forests and reducing waste. • At the end of the year, LCI S.r.l. Provides each school with a certificate stating the quantity, in tonnes, of paper that the school produced and successfully recycled.

Results achieved:	• At the beginning of 2018, the first containers were delivered to two schools in Oderzo, allowing students to start separating their waste and differentiating between paper and Cardboard. • Each month, the local recycling company comes to pick up this material, pack it, and get it ready to be sent to UPM Group paper mills and other partner mills working with LCI S.r.l. • Each tonne collected, therefore, corresponds to a value (e.g. € 40.00), which is then placed in a "piggy bank", which the school can use to cover a range of expenses. • The total for each school is reported on the website www.lci-srl.it, in a dedicated and reserved area. • Whenever the school decides to pay for something with the amount generated by collecting paper, it must send a specific request to LCI S.r.l., which will then proceed to make the payment.
Innovation:	This project represents an excellent opportunity to achieve a long-awaited revolution in optimising how we use natural resources and manage waste, reducing the use of landfills and the burning of waste for energy purposes, with the core drivers being the environment, the economy and the social context. This is an excellent chance for many young students to play a leading role in this epic change, paving the way towards a more sustainable and respectful world and becoming virtuous citizens who look after the environment and Mother Nature.
Empowerment:	Each school participating in the project will have its own private area on the website www.lci-srl.it to insert the quantity of material collected after each pick-up. The weight of the material will have a price based on the month of collection. This price is set by the official list issued by the "Milan Chamber of Commerce", under the items relating to the two types of material being collected: - item 130 - a type of material: 1.02.00 - Paper and mixed Cardboard for Cardboard - item 160 - a type of material: 1.06.00 - White paper, Magazines and newspapers The price stated by this list each month will be the reference price assigned to the schools taking part in the project
Website:	www.lci-srl.it

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Contacts:	lci@lci-srl.it
Picture:	

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VI. Sostenibilità, Economia Circolare, Lotta Agli Sprechi Alimentari

ECO-FUTURE– BEST PRACTICES	
Name:	Sostenibilità, economia circolare, lotta agli sprechi alimentari
When:	November 2021- May 2022
Where:	Forlì, Italy
Who:	ConsulenzaAgricola.it
Objectives:	• Emphasising the necessity of building a balanced relationship between the environment, agriculture, food, natural resources, food waste, and the needs of human beings is fundamental to achieving the goals of sustainable development as enshrined in the United Nations "goals" in the Global Agenda 2030. • Induce important reflections on a healthier and more sustainable lifestyle. Subjective responsibilities and the importance of imposing a new culture based on awareness will be highlighted. • Provide examples of "case histories" from the area, bringing young people closer to the concept that the circular economy can be a chance and an opportunity to start a career path. • Emphasise how daily behaviours represent indispensable elements for the civil growth of a people and the enormous contribution that each of us can provide for enhancing our Earth.
Stakeholders of the project:	- Educators - Schools
Beneficiaries:	- Students of the Secondary Schools involved - Families of the students involved - Educators
Financing:	• N/A
Description:	The project consists of a path of knowledge and information, delving into issues involving crucial "challenges" for the future of our planet. The first part of the project includes meetings with experts in the field who will give a theoretical background to the topic and be ready to dialogue with students. On the other hand, the second part of the project calls for the students to be actively involved in the activity.

	At the end of the meeting, students will have 4 months to devise and document in video or in a commercial on the topic of sustainability and circular economy. They will participate in a final competition between schools.
Results achieved:	In total, 13 schools participated in the project with all their classes.
Innovation:	The innovative aspect of this type of practice involves introducing extracurricular knowledge and practices in the school setting, which prepares students to be responsible individuals and to interface with issues that affect their daily lives. Moreover, students are urged to be part of the change because they are called upon to produce their own input on the issue through digital tools.
Website:	https://consulenzaagricola.it/economia-circolare/progetto-scuola-sostenibilita-economia-circolare-e-lotta-agli-sprechi-alimentari
Contacts:	N/A
Picture:	

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VII. Tinkering EU: Building Science Capital For All

ECO-FUTURE– BEST PRACTICES	
Name:	TINKERING EU: Building Science Capital for ALL
When:	Start date 01-09-2017 End date 31-08-2020
Where:	Milan, Italy
Who:	Fondazione Museo Nazionale Della Scienza E Della Tecnologia Leonardo Da Vinci
Objectives:	- develop young people's 21st C. skills and Science Capital. - improve school practice through an innovative pedagogy (Tinkering) and a new science education approach (Science Capital). - encourage the exchange of expertise and practice between formal and informal learning institutions. - create a Europe-wide community of practice.
Stakeholders of the project:	• Educators • Schools
Beneficiaries:	- Teachers of primary and junior high schools and students of 8 to 14 years
Financing:	Eu Grant: 427.713,00 €
Description:	"Tinkering EU: Building Science Capital for ALL" uses the innovative pedagogy of 'Tinkering' in activities and resources aiming to develop 21st-century skills and the Science Capital of disadvantaged youth and contribute to developing inclusive science learning in schools. The project emerges from: - the demands of contemporary societal challenges for citizens equipped with 21st-century skills and competencies; therefore, there is an urgent need for approaches and resources capable of building the knowledge and skills necessary to meet these demands. - the increasing need to foster learners from vulnerable groups and disadvantaged socio-economic backgrounds, thus the need for action towards social inclusion and equity that fights xenophobia and economic disparity. - the increasing importance of science as a tool for active citizenship. - the difficulty of schools, despite the efforts, to build a positive relationship between youth and science, especially those from disadvantaged communities.

	The project considers that science museums and schools can play a key role in developing 21st-century skills, science capital, and social justice, fostering science literacy amongst all individuals. In the project, museums and educational institutions cooperated with the aim of: - develop young people's 21st C. skills and Science Capital. - improve school practice through an innovative pedagogy (Tinkering) and a new science education approach (Science Capital). - encourage the exchange of expertise and practice between formal and informal learning institutions. - create a Europe-wide community of practice.
Results achieved:	Results a) Tinkering activities were experienced by 3450 students, tested by 16 teacher ambassadors, and evaluated by 179 more teachers. b) A methodological framework on using Tinkering to develop young people's Science Capital. c) Training events for teachers and museum staff. d) Multiplier events for the wide implementation of the activities across disadvantaged schools. e) Evaluation tools that can be used to foster a self-reflection approach to teaching and learning. f) A website with resources and activities available to everybody and dissemination reaching about 1000 more formal and about 500 informal education professionals inside and outside the Consortium.
Innovation:	Use the innovative pedagogy of 'Tinkering' in activities and resources to develop the 21st-century skills and the Science Capital of disadvantaged youth and contribute to inclusive science learning in schools.
Empowerment:	Tinkering EU addressed primary and junior high school teachers and students of 8 to 14 years. It reached 195 teachers and 3450 students for a total of 3645 participants through: - developing a methodology on the role of Tinkering for Science Capital. - the design of Tinkering activities. - Training workshops for teachers and museum staff to build knowledge and skills in Tinkering and Science Capital. - the organisation of multiplier events for schools, some participating for the first time in similar initiatives. - an evaluation and self-reflection process for participating teachers. - dissemination actions at local, national and European levels.

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Website:	http://www.museoscienza.it/tinkering-eu2/
Contacts:	Fondazione Museo Nazionale Della Scienza E Della Tecnologia Leonardo Da Vinci Via San Vittore 21, 20123 Milano, Italy Coordinator Type: Non-Profit making cultural organizations Phone: +390248555402
Picture:	

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VIII. Not One Less

ECO-FUTURE– BEST PRACTICES	
Name:	Not one less
When:	Start date 01-09-2018 End date 28-02-2021
Where:	Foggia, Italy
Who:	Scuola Statale Primaria San Giovanni Bosco
Objectives:	The project was based on adopting the Tinkering methodology in the pre-school, introducing Coding and Robotic activities in the primary school, and experimenting with CLIL methodology in STEM subjects.
Stakeholders of the project:	• Educators • Schools
Beneficiaries:	• Teachers • Pre-school children
Financing:	Eu Grant 52.465,00 €
Description:	The project included three schools, two from Italy and one from Spain, involving pupils from different school levels and teachers who followed the training provided for in the LTTA and built innovative educational paths. It started in 2018, and due to the pandemic, it ended in February 2021 after the request for an extension. The project provided a solid structure to allow teachers to use new methodologies in teaching by improving the level of knowledge and the level of use of the English language, sharing good educational practices for teaching science subjects. Using very diversified work methodologies during the project phases allowed the inclusion of disadvantaged pupils, increasing and developing motivation and interest in learning as well as interpersonal relationships and the growth of self-esteem, as well as achievement of some European key competencies such as Communication in foreign languages, Digital competence, Learning to learn, Social and civic competences.

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Results achieved:	Attending the different LTTAs, Coding in CLIL, Tinkering and Educational Robotics, teachers gained valuable knowledge of Coding and the role of computational thinking in the teaching/learning of STEM disciplines; they learned the most suitable methodological principles for introducing these disciplines into the curriculum, and they planned learning units that were experimented in the schools. Participating in the short-term exchange of pupils allowed them to increase their motivation and interest in learning as well as interpersonal relationships and the growth of self-esteem, acquire an awareness of European citizenship by collaborating with classmates from different countries, and use English as the vehicular language.
Innovation:	The methodologies used promoted the achievement of the objectives; in fact, the students have: • improved their abstraction capacity, which is the ability for creative thinking and problem-solving, • improved communication, logical and digital skills by acquiring new verbal and non-verbal codes.
Empowerment:	This project has undoubtedly enriched the educational offer of the schools involved in acquiring transversal skills. However, above all, it has provided teachers and students with those skills of lifelong education that will give them long-term benefits.
Website:	N/A
Contacts:	Scuola Statale Primaria San Giovanni Bosco Via Ordona Lavello 71121 foggia, Puglia, Italy Coordinator Type: School/Institute/Educational centre – General education (pre-primary level) Phone: +349 0881631586
Picture:	

IX. Circle Lab

ECO-FUTURE– BEST PRACTICES	
Name:	CIRCLE LAB Innovative learning approach for circular chemistry in secondary education
When:	2021-2023
Where:	Sweden, Italy, Lithuania, Spain, and North Macedonia
Who:	MAELARDALENS HOEGSKOLA – Sweden
Objectives:	To provide innovative teacher training courses and educational tools for secondary education students to promote integrated approaches for sustainable chemistry through circular economy concepts.
Stakeholders of the project:	Universidade da Coruña. Advanced Scientific Research Centre (CICA), Consorzio Scuola Comunità Impresa. CSCI, ECO LOGIC, Kauno Dainavos progimnazija, Mälardalen University, Non-Formal learning club, SOU Orde Copela Prilep, Rudbeckianska gymnasiet, SC Sviluppo chimica S.p.A.
Beneficiaries:	Pupils and teachers from Secondary Schools
Financing:	Erasmus+ KA201
Description:	CIRCLE-LAB is an Erasmus+ project about an innovative learning approach for circular chemistry in secondary education that aims to develop teacher training courses and educational tools around the topic of circular economy with a focus on sustainable chemistry; in particular, the platform will offer several digital tools such as videos, games, interactive manuals for the education of the school players (students, teachers, families) to enhance pupil´s and teachers´ awareness on sustainability and circular economy, supporting active citizenship, boosting their transversal skills and their interest in #STEAM subjects. The project aims to develop four Intellectual Outputs: 1. Circular Economy Modules 2. Teacher Training Program 3. Circular Chemistry Game / Educational Toolkit 4. CIRCLE LAB Online Environment

Results achieved:	The desired impact at the local and regional level is that the CIRCLE-LAB may become a reference in developing skills for circular chemistry and achieve the highest adhesion and participation by the individuals and organizations involved in each partner's network in order to offer services and support to learning activities about circular chemistry. At the national level, the desired impact is to involve potential schools and teachers in the field of circular chemistry that can be multiplier actors and contribute to the use of Project results. At the European level, the project will enforce the promotion of circular chemistry and ESD principles and its added value on the environment as well as on the social and economic level. Teachers are developing unique teaching tools to attract students' interest in chemistry. Ideal teaching tools are the ones that students can enjoy utilizing and reutilizing, which can be constructed without much effort. LEGObricks and LEGO-based models have been used as teaching tools across many fields, from early childhood education to computer programming. They are creating a new curriculum for circular chemistry in the schools. An Innovative learning approach for circular chemistry in secondary education is collaborating to develop a series of school enrichment programs that teach students about circular chemistry through hands-on activities. Ultimately, it will focus on the infrastructure of circular innovation by creating a space where policymakers and consumers can unite to reinforce their ideas around the circular economy.
Innovation:	With Circle Lab, the implementation intends to bring chemistry education closer to sustainability. The CIRCLE-LAB project promises to increase teachers' confidence in the circular economy and provide a web resource that helps them form their resources (videos, interactive tutorials, games). It will use digital technologies' reach and scalability to raise awareness at scale. Circle Lab supports sustainable chemistry education in secondary schools by offering educational tools such as videos, games, interactive manuals, etc. These tools aim to raise awareness of sustainability and circular economy principles and enable them to develop skills relevant to our future. They want to support kids in improving their critical thinking, creativity, problem-solving, digital competencies, and teamwork and communication skills.

Empowerment:	Innovative learning tools enable educators, pupils and families, through an innovative learning approach, to use and experience a circular economy. Circular economy in education means that students apply and practice the principles of the circular economy in their school experience, contributing as active citizens to build a more sustainable world. The core aim of this project is to develop innovative learning tools enabling educators, pupils and families, through an innovative learning approach, to use and experience a circular economy. Training materials are already available and developed as part of several EU projects on Open Educational Resources (OER). The proposed project CIRCLE-LAB will help promote this work by piloting it in schools, adapting different educational models possible for secondary education pupils, training teachers on delivering these materials, and giving them further support to create their materials.
Website:	https://www.circlelab-erasmus.org/circle-lab
Contacts:	https://www.facebook.com/profile.php?id=100079697094486
Picture:	

X. Green Economy Promotion

ECO-FUTURE– BEST PRACTICES	
Name:	GREEN ECONOMY PROMOTION
When:	2019
Where:	Berane
Who:	NGO "CENTER OF ENVIRONMENTAL INITIATIVES" BERANE
Objectives:	Affirmation of sustainable management of natural resources through the use of renewable energy sources, promotion of the greening of the economy and improvement of students' knowledge of the green economy.
Stakeholders of the project:	- 400 students from OU Radomir Mitrović; - 40 teachers from the same school; - About ten companies; - Public institutions from the territory of Berane have a natural need for additional savings on resources.
Beneficiaries:	NGO "CENTER OF ENVIRONMENTAL INITIATIVES" BERANE
Financing:	€ 6,000.00, European Union
Description:	Implementation of project activities for improving environmental protection through the education of students for a circular green economy. Research for the level of meaning and application of the concept of the circular green economy at the local level; Affirmation of sustainable management of natural resources through the use of renewable energy sources, promotion of the greening of the economy and improvement of students' knowledge of the green economy.
Results achieved:	- Education of more than 400 students through 22 workshops to raise awareness for the preservation of natural resources, benefits from the circular green economy, examples for good practitioners, etc.; - Competition for the preparation of literary works on the topic of Innovative projects in the field of the circular green economy; - Promotion of the circular green economy; - Debate
Innovation:	The innovation of this project is reflected in the promotion and the application of the concept of the green economy at the local level, that is, in the territory of the municipality of Berane. We know that only if we start respecting the principles of the green economy can our economy and nature progress side by side.

Empowerment:	A small community such as Berane can promote the creation of new jobs, improve energy efficiency and influence the environmentally responsible behaviour of its residents by introducing green jobs. Wastewater treatment and purification systems were recently completed and put into operation in Berane, as proof that the issues of life environment must be solved with the accession to the EU. This project contributed to popularizing the work of NGOs, promoting the circular green economy, and involving students and citizens in the environmental sector, which will have a long-term impact. In a short time, it changed the existing attitudes and opinions of citizens regarding the environment.
Website:	http://www.ceicg.me/
Contacts:	nvocei2014@gmail.com

XI. RE-CYCLE, Bike reuse and Riding fair

ECO-FUTURE– BEST PRACTICES	
Name:	RE-CYCLE, Bike reuse and Riding fair
When:	2022 - 2024
Where:	Lombardy (Italy), North Macedonia, Austria), France, Germany.
Who:	Region of Lombardy – Directorate of Sport and Youth
Objectives:	The overall objective of the “ReCycling" project is to reestablish a healthy lifestyle among kids and, at the same time, to promote social inclusion and a circular economy in the biking sector.
Stakeholders of the project:	Lombardy is the Directorate of Sport and Youth, which in Italy cooperates with the partner Consorzio Ibis. The other partners are the Ngo Eco-Logic (Macedonia), Easy-Driver Radfahrschule (Austria), L’Heureux Cyclage (France) and Mountainbike Tourism Forum (Germany).
Beneficiaries:	Teachers and students from Middle High Schools and High Schools
Financing:	Erasmus Sport Program
Description:	COVID emergency restrictions have seen a general decrease in children's participation in sports and, concurrently, an increase in their struggles with eating disorders and other psychological troubles. Yet, 2020 also saw a boom in bike sales and a significant increase in bike lane coverage. Bike Reuse and Riding Fair” is to re-establish a healthy lifestyle among kids through cycling and to promote a circular economy in the biking sector.
Results achieved:	Cycling-related public events, workshops with students and teachers
Innovation:	Online training program on bike repair, reuse and safe disposal for teachers, cycling instructors, and bike repairers so they can train in the presence of kids and families.
Empowerment:	Fairs with bike rides, bike repair workshops, and creative activities will be held in every partner country.
Website:	https://ecologic.mk/re-cycle-bike-reuse-and-riding-fai/

XII. School Plastic Free Movement

ECO-FUTURE– BEST PRACTICES	
Name:	School Plastic Free Movement
When:	2020-2022
Where:	Turkey, Bulgaria, North Macedonia, Lithuania, Italy, Spain
Who:	Polo Europeo della Conoscenza – ITALY
Objectives:	To find rhythms closer to nature of which we are an integral part and to produce as little waste as possible
Stakeholders of the project:	Students, pupils, kids
Beneficiaries:	Polo Europeo della Conoscenza – ITALY, Consejería de Educación. Junta de Castilla y León – SPAIN, Friends of Education – North Macedonia, Panevezys District Education Centre – LITHUANIA, Trakia University – Department for Information and In-service Teacher Training (DIITT) – BULGARIA, UŞAK İL MİLLİ EĞİTİM MÜDÜRLÜĞÜ Uşak Provincial Directorate of National Education – TURKEY
Financing:	European Commission in the scope of Erasmus + KA3 Programme
Description:	The Schools Plastic Free movement has taken its origins from the need to educate future generations and invent all possible ways to replace plastic with alternative, sustainable, and eco-compatible materials. (The movement aims to start from the schools, inviting them and any educational institutions from all over the world to join it. We want to begin a process of awareness from children and young people, from their love for nature and life, to lead them to a transformation in consumption and ecological choices, both for themselves and for the adults around them, to give to the new generations a possibility to regain slower rhythms and a more sustainable idea of consumption in daily life.

Results achieved:	-Educated children to avoid using plastic and be aware of the environmental problems connected with the use of plastic, -Developed kids' creativity to invent material and tools of alternative origin to use instead of plastic in schools permanently, -Created an online platform with all the sharing experiences, -Proposed online sharing games, activities, strategies to prevent the use of plastic, -Created a European and extra-European movement of schools/ institutions/ NGOs -Involved children's families in changing their habits and not using plastic anymore -Create a school brand as a symbol of social involvement in the process, -Elaborated lesson plans or activities about the plastic effect on human beings and the Earth
Innovation:	Schools and organizations of the Schools Plastic Free movement created a worldwide community into a "nobody less" network to exchange good practices, in which each school/organization will present its alternatives to plastic and all related activities.
Empowerment:	The students/pupils/kids of the schools or any institution that will become part of the movement will have to commit themselves to identify several plastic objects (as the beginning of a transformation process) to be replaced with other alternative materials (recycled, sustainable, eco-compatible), of their inventions and which they become permanently everyday objects in the relative educational institutions and that they are shared in a platform with all the ideas that will come from all over the world. Database of prosocial games, Curriculum for teachers' training, Platform for the prosocial training, Analysis of the pilot phase, Evaluation tolls for the piloting phase
Website:	https://schoolplasticfreemovement.org/

XIII. Circular Economy in Service on School Development

ECO-FUTURE– BEST PRACTICES	
Name:	Circular Economy in Service on School Development
When:	2018
Where:	Skopje, Republic of North Macedonia
Who:	NGO “PROTEKTA”
Objectives:	The project contributed to strengthening the capacities of primary schools to advocate for a circular economy model. It also enabled the creation of new programs that will be implemented as extracurricular activities in primary schools.
Stakeholders of the project:	Teachers and students from 5 Primary Schools in Skopje, North Macedonia
Beneficiaries:	NGO “PROTEKTA”
Financing:	The European Union funds the project within the Civil Society Program and Program for 2016-2017. It is co-financed by the Ministry of Public Administration, Digital Society and Media in N.Macedonia € 5,990.00
Description:	Analysis of the possibilities for implementing the circular economy; - Analysis of primary schools in Skopje and mapping of potential members of the pilot project; - Public discussion Application of the circular economy in practice for primary school teachers in Skopje; - Training for teachers from primary schools in Skopje; - Workshops for students; - Preparation of recommendations for introducing a circular economy in schools and creating a support mechanism; - Formation of circular economy clusters; - Round table Circular economy - challenge or opportunity for local government.
Results achieved:	The project promoted a circular economy model in five primary schools in Skopje. Furthermore, students and teachers were introduced to applying the circular economy model through projects and extracurricular activities. At the same time, a cluster for the circular economy was formed, and the final result of the project was an increase in the level of awareness of students about the importance of their inclusion in the circular economy process.

Innovation:	In the project, there is only one mission for this newly created value: when something stops being consumed, it becomes a new raw material for another industry. The project aims to support teachers' professional development by applying practical and innovative tools to promote circular chemistry in primary schools. Within the framework of the project, didactic materials and educational games will be prepared, which will be placed on an online platform that will be available to all interested parties.
Empowerment:	PROTECTA increased the capacities of its employees when it comes to the circular economy and thus became known as the bearer of this idea. The successful application of the circular economy concept in primary schools in Skopje depends primarily on intersectional cooperation and the exchange of information and knowledge. Innovation lies at the core of the circular economy, and our city must find the means and political will to apply innovative ideas and work on their development. The education of teachers and students, the incentive for the circular economy, and giving importance to expertise must become priorities in the thinking and work of primary schools. The five primary schools showed changes in their curriculum initiated by our project. For the first time, they put the topic of circular economy as extracurricular and project activities. Also, the organization plans to present the project results to other elementary schools in the city. This is another concrete application of the project results by the project participants.
Website:	www.protecta.org.rs
Contacts:	centar@protecta.org.rs

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XIV. The Art of Cycling

ECO-FUTURE– BEST PRACTICES	
Name:	The Art of Cycling
When:	Project start date: 01.04.2021 Duration: 24 months Project end date: 31.03.2023
Where:	North Macedonia, Italy, Hungary
Who:	Eco-Logic- North Macedonia
Objectives:	The Art of the Bicycle project focuses on beginners with insufficient cycling knowledge. The project aims at primary school students aged 6 - 12 years, starting with what they need to start riding a bike and ending with how to ride correctly in the first part (Part A). At the same time, the second part (Part B) of the project is more challenging, but it can also be fun because it shows the whole process of renovating a bike. It aims to support the professional development of elementary school teachers by applying practical and innovative tools to promote circular chemistry in primary schools.
Stakeholders of the project:	Teachers and students in Primary schools
Beneficiaries:	Eco Logic (Macedonia), Vuelta Sportegyesulet (Hungary), and Centro per lo sviluppo creativo Danilo Dolci (Italy)
Financing:	Erasmus+
Description:	Filming seven separate videos with practical cycling tips and theories for beginners. From a video on: "what you need to start cycling" to a video on "how to adjust the seat height", M-check, maintenance, bike repair... and even "rules for cycling in traffic and dangerous situations." Two workshops each for all partners in the bicycle parts reuse project. IO will be delivered in two ways: through videos, 10 in total, and courses, 10 in full, available for both computers and mobile phones (a mobile application will be produced and available on the Google Play Store). Delivery of 3 multiplier events in 3 countries: each event will be delivered outdoors and according to all existing protocols at the given time. More events will be organized, such as day-long events where art meets bikes, where students and teachers can attend workshops to maintain and repair their bikes and where they can bring their bikes to beautify local artists through various means of expression from recycled material - painting, stickers, etc.

	The type of artistic expression is in the hands of the partner organization and local participants; it can be anything from film or theatre, dancing or singing to painting and sculpture - as supporting parts of the events, but with an emphasis on using materials from recycled material. Delivery of local workshops (smaller version of multiplier events), which will be held three times per country, before publishing the Intellectual Output of the project. These workshops will also be delivered outdoors and aim to present a specific intellectual output as they develop how to reuse bicycle parts involving students, teachers and artists throughout the project. Each partner organization will organize these events in close cooperation with local cycling initiatives and artists. All organizations delivering the workshops must document them appropriately and attractively to the audience (video, painting, etc.)
Results achieved:	- Videos with practical cycling tips and theories for beginners - Workshops for students and teachers from Primary Schools in the bicycle parts reuse part of the project -Multiplier events
Innovation:	Produced mobile app, available on Google Play Store
Empowerment:	Encouraging teachers and students to reuse bicycle parts
Website:	https://www.facebook.com/artofcyclingproject
Contacts:	https://www.facebook.com/artofcyclingproject
Picture:	

XV. Partnership for Circular Economy

ECO-FUTURE– BEST PRACTICES	
Name:	Partnership for circular economy – a sustainable network of primary and secondary schools and regional development
When:	June 2020 – June 2021
Where:	North Macedonia
Who:	Entrepreneurial service foundation for young people
Objectives:	The project's primary goal is to contribute to advancing regional development through networking and strengthening the capacities of primary and secondary schools and civil society organizations by promoting the concept of a circular economy. Specific objectives of the project: - Strengthening of regional cooperation through activities for networking and capacity building among primary and secondary schools and civic organizations. - Introducing the concept of circular economy and improving the skills of students and teachers in primary and secondary schools for transitioning to a circular economy. - Creating opportunities to hold activities in schools by strengthening the circular economy between schools and civil society organizations. - Raising awareness of the benefits of the circular economy among citizens through key stakeholders/stakeholders/actors.
Stakeholders of the project:	Primary and secondary schools, NGO
Beneficiaries:	Entrepreneurial service foundation for young people
Description:	The circular economy differs from the linear economy in that it primarily focuses on recovering, repairing and reusing materials and encouraging sustainable development. This economic system replaces the concept of "end-of-life" with reuse, recycling and recovery of materials during production, distribution and use. In this way, the environment and its quality, economic prosperity and social equality are simultaneously improved, all for the benefit of current and future generations. National and local authorities should support the circular economy through sectorial policies and other instruments, while at the same time, it should be initiated by the civil and business sectors.

Results achieved:	- Capacity building program - circular economy training for students from primary and secondary schools and civic organizations - Online courses for circular economy - Educational videos on the circular economy – opportunities for activities in schools - Promotional video materials
Innovation:	Created a network between seven elementary and seven secondary schools and three civic organizations to maintain activities related to the circular economy and provide circular economy training to other schools and organizations.
Empowerment:	Strengthened capacities of students and teachers as well as members of NGOs for the circular economy.

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XVI. TAT Yrityskylä Alakoulu (Enteprise Village Primary School)

ECO-FUTURE– BEST PRACTICES	
Name:	Yrityskylä Alakoulu (Enterprise Village Primary School)
When:	6/2017 – 1/2020
Where:	The Project was implemented in primary schools in ten different areas in Finland.
Who:	TAT´s (Economics and Youth) Yrityskylä (Enterprise Village)
Objectives:	The objective of Yrityskylä Alakoulu was to improve the economic skills of the sixth graders and to bring the teaching of the circular economy into the curriculum of the Yrityskylä learning environment. TAT started circular economy work in the fall of 2017 with the support of Sitra. The objective was to make the circular economy part of teaching economic and working life skills. The students wanted to question the current unsustainable lifestyle by learning about the circular economy. In addition, the purpose was to increase understanding of the limited nature of natural resources and their importance to the economy. TAT's and Sitra's project was to bring the circular house into the learning complex of Yrityskylä.
Stakeholders of the project:	Economy and Youth TAT, Kaisa Koistinen The Finnish Innovation Fund SITRA
Beneficiaries:	6th graders
Financing:	The Finnish Innovation Fund SITRA
Description:	Yrityskylä Alakoulu is a learning entity for society, the economy, and working life. The whole comprises apprenticeship training, Yrityskylä lessons, and an experimental school day in a miniature society. Yrityskylä Alakoulu is a learning entity for society, the economy and working life. The whole curriculum comprises teachers´ training, Yrityskylä lessons, and an experimental school day in a miniature society. Yrityskylä Alakoulu reached 86% of sixth graders in Finland and operates in ten locations. The circular economy was combined with Yrityskylä Elementary School's teaching unit on economics.
Results achieved:	Yrityskylä Alakoulu reached 86% of sixth graders in Finland and operated in ten locations.

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Innovation:	During the project, the circular economy was integrated into the learning targets and modules of Yrityskylä Alakoulu. During the 2018-2019 school year, the learning material was wholly renewed by giving more visibility to the circular economy. The students became acquainted with the significance of natural resources for the economy and the definition and business models of the circular economy.
Empowerment:	In 2019, Yrityskylä reached almost 77,000 learners. Furthermore, TAT provided circular economy training and orientation to more than 1,000 teachers and introduced all of its staff to the circular economy.
Website:	https://www.sitra.fi/en/projects/yrityskyla-learning-environment/ https://tat.fi/ainotesopankki/on-aika-siirtya-kiertaloueen/ https://yrityskyla.fi/en/ https://www.sitra.fi/artikkelit/kiertotalous-teki-kouluissa-lapimurron/
Contacts:	Jenni Järvelä Tel. +358 40 556 7156 jenni.jarvela@tat.fi Kaisa Koistinen +35850 530 3969 Kaisa.Koistinen@tat.fi
Picture:	

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XVII. Circular economy teaching for all levels of education

ECO-FUTURE– BEST PRACTICES	
Name:	Circular economy teaching for all levels of education
When:	2017-2019
Where:	Finland
Who:	The Finnish Innovation Fund SITRA with over 50 schools, universities, educational organisations and companies.
Objectives:	The objective was to challenge the entire educational sector to consider what type of world we want to create. An effort was made to ensure that every industry has experts in the circular economy.
Stakeholders of the project:	**Colleges, Universities and other educational institutes** **Colleges and vocational colleges:** Espoon seudun koulutuskuntayhtymä Omnia, Etelä-Kymenlaakson ammattiopisto, Länsi-Uudenmaan koulutuskuntayhtymä Luksia, Lounais-Suomen koulutuskuntayhtymä Novida, Saimaan ammattiopisto Sampo, Savon ammattiopisto Sakky, Stadin ammattiopisto, Suomen ympäristöopisto SYKLI, Vantaan ammattiopisto Varia **Universities of applied sciences:** Centria-ammattikorkeakoulu, Haaga-Helia, Hämeen ammattikorkeakoulu, Kaakkois-Suomen ammattikorkeakoulu, Karelia-ammattikorkeakoulu, Lahden ammattikorkeakoulu, Lapin ammattikorkeakoulu, Laurea, Metropolia, Oulun ammattikorkeakoulu, Savonia-ammattikorkeakoulu, Seinäjoen ammattikorkeakoulu, Tampereen ammattikorkeakoulu, Turun ammattikorkeakoulu, Vaasan ammattikorkeakoulu, Yrkeshögskolan Novia **Universities:** Aalto University, the University of Helsinki, the University of Eastern Finland, the University of Jyväskylä, Kokkola University Consortium Chydenius, LUT University, the University of Oulu, TTY University, the University of Tampere, the University of Turku, the University of Vaasa, Yale University. **Other educational organisations:** Helsinki Think Company, Heureka, Edupoli, Kouvolan Aikuiskoulutussäätiö, the Finnish Nature League, Nuori Yrittäjyys ry, Finnish National Agency for Education, Economy and Youth TAT.
Beneficiaries:	Educational institutes, schools, students
Financing:	The Finnish Innovation Fund SITRA

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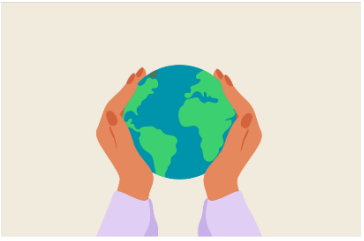
Description:	SITRA cooperated with all levels of educational organizations to ensure that circular economy thinking reaches as many Finns as possible. That way, SITRA wanted to provide future experts with tools to build a sustainable future and new business. It also trained professionals who are educated in lifecycle thinking and extensive cooperation and who understand that economic growth in a circular economy is not dependent on the consumption of natural resources.
Results achieved:	Over 70,000 children and young all around Finland studied circular economy in 2018-2019.
Innovation:	SITRA developed and tested the learning materials and courses with partners of all educational levels.
Empowerment:	Schoolchildren of all grades and students got to know about the circular economy.
Website:	https://www.sitra.fi/en/projects/circular-economy-teaching-levels-education/#what-was-it-about
Contacts:	Nani Pajunen, Leading Specialist, Sustainable solutions, SITRA nani.pajunen@sitra.fi, nani.pajunen@afry.com
Picture:	

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XVIII. Kierroksia! (Cycles!)

ECO-FUTURE– BEST PRACTICES	
Name:	Kierroksia! (Cycles!)
When:	2018-2019 (the study material was published on 24.1.2020)
Where:	Finland, Elementary schools around the country
Who:	Finnish National Agency for Education, The Finnish Innovation Fund SITRA
Objectives:	The project's objective was to develop the best way to inspire and teach 3rd- 6th-grade schoolchildren to live more sustainably, understand the basic principles of sustainable manufacturing and consumption, and get tools for the coming ecological revolution.
Stakeholders of the project:	Finnish National Agency for Education, Anni-Elina Karvonen The Finnish Innovation Fund SITRA, Sari Laine LYFTA, YC Felin
Beneficiaries:	3.-6. graders of elementary school pupils
Financing:	The Finnish Innovation Fund SITRA Finnish National Agency for Education
Description:	The project was initiated by SITRA and the Finnish National Agency for Education, and LYFTA was selected as its implementer through a tender. Kierroksia! is a digital learning material about sustainable everyday life and the circular economy for grades 3–6 in elementary school. Learning material helps students realize that everyone can influence the development of their future and sustainable society. The learning material contains over 80 ready-made lessons and the fascinating stories of four people striving for a sustainable everyday life. It is suitable for both independent study and working together. The digital learning platform gives the teacher practical tools to bring circular economy themes close to the students' own lives. According to the curriculum, kierroksia! Learning material meets the goals of a sustainable lifestyle. The learning material crosses subject boundaries: while studying the circular economy and sustainable everyday life, you also learn, among other things, the learning content of the mother tongue and literature, geography, visual arts and handicrafts. With the experiential learning material, the child will quickly gain an understanding of how each of us can be a circular economy expert.

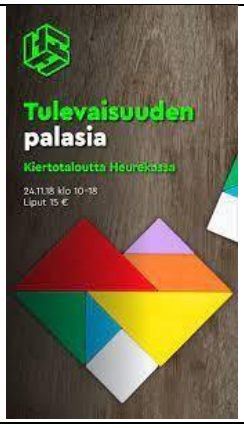
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Results achieved:	The learning material contains over 80 ready-made lessons and the stories of four people striving for sustainable everyday life. It is suitable for both independent study and working together. In primary school grades 3-6, the students and their teachers can use the material free of charge.
Innovation:	The digital learning material crosses subject boundaries: while studying the circular economy and sustainability in everyday life, pupils also learn, among other things, the learning content of the mother tongue and literature, geography, visual arts and handicrafts.
Empowerment:	In the Cycles! Project, digital learning material was produced and published for use by teachers, and it was aimed at elementary school grades 3-6. pupils. The learning material was available for free to all teachers.
Website:	https://www.sitra.fi/hankkeet/kestavan-arjen-ja-kiertotalouden-oppimateriaali-alakouluihin/ https://www.sitra.fi/artikkelit/ope-hei-uusi-kiertotalouden-oppimateriaali-on-taalla/ https://www.oph.fi/fi/uutiset/2020/uusi-oppimateriaali-kiertotaloudesta-innostaa-kestavan-arjen-tekoihin https://lyfta.fi/kierroksia
Contacts:	Johanna Lahti, learning material manager, Opetushallitus phone 029 533 1535; johanna.lahti@oph.fi • Tiina Sipilä, learning materials manager, Opetushallitus phone 029 533 1337; tiina.sipila@oph.fi • Sari Laine, leading expert, Sitra, tel. 029 461 8445; sari.laine@sitra.fi • YC Felin, project coordinator, Lyfta, tel. 045 134 1336; yc@lyfta.com
Picture:	

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XIX. Kiertotehdas (Circular Factory)

ECO-FUTURE– BEST PRACTICES	
Name:	Kiertotehdas (Circular Factory) Circular Economy program “Tulevaisuuden Malaysia" (The Pieces of the Future)
When:	2019 (opening of the exhibition was 26th of October) -
Where:	Heureka, the Finnish Science Center Vantaa, Finland
Who:	Heureka, the Finnish Science Center The program and the exhibition had sections aimed at elementary school children
Objectives:	Science centre visitors are challenged to think about the use of everyday objects and materials as efficiently as possible.
Stakeholders of the project:	HEUREKA, the Finnish Science Center Aalto University, the University of Helsinki Helsinki Region Environmental Services (HSY), Reuse Centre, The Finnish Forest Industries Federation, SITRA, The Finnish Innovation Fund HSY, Environmental Services of Helsinki VTT Technical Research Centre of Finland METSÄTEOLLISUUS (The Forest Industry org.)
Beneficiaries:	HEUREKA, the Finnish Science Center The exhibition had
Financing:	SITRA, The Finnish Innovation Fund Neste Oyj, UPM Corp., VersoWood Corp.,
Description:	Heureka, the Finnish Science Center, has a circular economy program. Part of it was the circular economy exhibition prepared during the program. It was opened to the public on Saturday, October 26, at the Future Pieces event in Heureka. The Circular Factory exhibition illustrates the circular economy and sustainable development solutions. The Circular Factory is an exhibition on solutions for sustainable development. The visitors are recruited to work at a circular factory of the future, their task being the recycling of familiar objects and materials in an effective, environmentally friendly and economical way. The exhibition enables the visitors to extend product lifespans at a repair workshop, create recycled products at the up-cycling workshop and develop sustainable products at the inventor’s workshop. In addition to the circular economy exhibition, the program includes circular economy-related events, children's science camps, preparation of school learning materials, further training for teachers, and Circular Economy Day.

	The workshops and related learning materials deal with the principles and innovations of the circular economy. The detailed descriptions of the workshops related to the circular economy, as well as additional materials, can be freely downloaded and used by both teachers and other interested parties. The subjects of the learning materials are especially the new uses and recycling of forest-derived fibres and the utilization of waste and waste plastics as a material for future fuels, i.e., forest, waste, and energy. Learning materials are also implemented in cooperation with circular economy partners such as HSY, Neste OYJ, and Metsäteollisuus ry.
Results achieved:	The project and exhibition are still ongoing, so results are yet to be available.
Innovation:	The visitors get to act as the employees of a future circular factory, which aims to repair products and make recycled products. This can also create insights into how to reduce the consumption of natural resources. The game-like exhibition allows visitors to extend the life span of products at the repair shop, create recycled products at the recycled product shop, and develop products sustainably at the inventor shop.
Empowerment:	Tips from the Circular Factory to empower: Consider what you need. Acquire sustainably produced products and services. Take good care of what you have to extend their usable life. Borrow and rent. Only buy what you need, even if it is used or recycled. If you do produce waste, recycle it.
Website:	https://www.heureka.fi/exhibition/circular-factory/?lang=en https://www.metsateollisuus.fi/uutishuone/metsateollisuus-on-mukana-heurekan-kiertotehdas-nayttelyssa https://www.materiaalitkiertoon.fi/en-US/Current/An_event_called_Tulevaisuuden_palasia_pr(52870)
Contacts:	Jutta Kujasalo Head of programme production jutta.kujasalo@heureka.fi +358 40 9015 280
Picture:	

XX. Kiertotalousnetti (Circular Economy Website)

ECO-FUTURE– BEST PRACTICES	
Name:	Kiertotalousnetti (Circular Economy Website)
When:	8/2017 – 7/2019
Where:	The capital regions are Varsinais-Suomi, Etelä Savo, the Kuopio region, and the Oulu region.
Who:	The Finnish Nature League, Luonto-Liitto
Objectives:	Luonto-Liitto conducted school visits in the target area, where students were given information about the circular economy. The objective was that the lessons during the holidays encouraged students to do and think about things themselves. The young people's opinions were considered when planning the tasks because it was seen as necessary that the young people find the lesson exciting and motivating.
Stakeholders of the project:	The Finnish Nature League, Luonto-Liitto , Leena Koivula SITRA, The Finnish Innovation Fund, Riitta Silvennoinen
Beneficiaries:	Pupils of elementary schools in the target areas
Financing:	SITRA, The Finnish Innovation Fund
Description:	The Finnish Nature League, Luonto-Liitto, is a nationwide non-governmental nature and environmental protection organization for children and the youth. The Luonto-Liitto project offers circular economy-related school visits for middle school pupils. The idea of the visits is to give young people the opportunity to come up with ideas, use their creativity, and inspire young people to get to know the circular economy and the opportunities it offers. The lesson held during the visits encourages pupils to do and think about things themselves. The young people's opinions were considered when planning the tasks because the young people needed to find the lesson exciting and motivating. In addition, pupils and teachers were in a key position for the project. It is through them that the message reaches the schools and the pupils. Interaction with teachers is essential for the development of the project.

Results achieved:	In its project, Luonto-Liitto implemented circular economy-related school visits to middle schools and competitions in which a circular economy village or city was planned. In addition, Luonto-Liitto produced the Kiertotalousnetti. fi website, where teaching material for school lessons is available. Together with Aalto University Junior, an environmental group for young people, the Hope for Planet club was also implemented, the activities of which include the circular economy. Kiertotalousnetti.fi teaching material was presented at the art teachers' summer days, and an information package on the circular economy was prepared for the participants of the “Save Pond hockey” tournament. During the project, more than 11,000 school students were reached in different parts of Finland. The website (www.kiertotalousnetti.fi) was created during the project and is still available online.
Innovation:	During the school visit, they were given basic information about the circular economy, and after that, they were given the opportunity to familiarize themselves with the topic via the website. The students and teachers were in a key position for the project because it is through them that the message reaches the schools and the students. Interaction with teachers is important for the development of the project.
Empowerment:	A thesis was made about the project. According to the thesis, the circular economy visits of the Nature Association had a positive effect on the student's attitudes towards the circular economy and encouraged the students to influence and also make personal decisions in line with the circular economy.
Website:	http://www.kiertotalousnetti.fi/
Picture:	

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FOCUS GROUP RESULTS

Context and aim of the focus group

As part of the research, the partners decided to experiment with a focus group conducted at the national level to collect responses on the topic from stakeholders involved in the issue in their daily lives.

The focus group was implemented in March 2023 and targeted a small group of carefully selected participants who could contribute to open discussions about the needs of teachers in fostering Circular Economy and Sustainability values, together with understanding the best training opportunities offered by the Tinkering methodology.

The aim of the focus group was to gather information and experiences on the needs of teachers to provide proper activities for the children they work with. In this regard, the data collected during the focus group were particularly useful in understanding possible strategies to develop teachers' awareness regarding Circular Economy and Tinkering methodology, together with understanding how to validate efficient educational resources for school educators.

Methodology

Moving to the methodology used to proceed with the focus group, each partner carefully selected a minimum of 5 participants for the study to represent the larger population they're attempting to target, i.e. teachers, educators, trainers, or parents.

Moreover, the focus group could have been conducted both online or physically, depending on the needs of the organization. However, it should have led to a discussion on the topic, allowing participants to express their thoughts and ideas freely.

ITALY

Participants' information

The focus group aimed at collecting information and experiences of the Italian context was implemented by the organisation MVNGO in March 2023.

Five (5) participants took part in the meeting that was held online. All the people involved (1 male, 4 female) are working as middle school teachers aged 33-58 years old.

The table below (table 1) shows more detailed information about the participants, such as age, sex, geographical origin, and education level (Bachelor's degree [BD] or Master's degree [MD]). All teachers participating in the focus group work in 2 different schools and regions:

- 2 out of 5 work as support teachers in a middle school in the Umbria region;
- 3 out of 5 work as *Technology and Economics* teachers in a High school focusing on agriculture in the Sardinia region.

Table 1:

Profile	Name	Age	Country of origin	Education	Profession
Participant 1	Francesca	36	Italy - Umbria	MA	Teacher in middle school
Participant 2	Laura	33	Italy - Umbria	MA	Teacher in middle school
Participant 3	Donatella	55	Italy - Sardinia	BA	Teacher in high school
Participant 4	Roberto	49	Italy - Sardinia	BA	Teacher in high school
Participant 5	Patrizia	58	Italy - Sardinia	BA	Teacher in high school

Questions and discussion

In this paragraph, we will present the questions administered to the participants to foster the discussion. Every question will be followed by notes that collect participants' contributions to the discussion.

- *Do you know what Circular Economy is? Can you give examples?*

All participants knew about Circular Economy (CE) and provided direct examples of how they usually include the topic in their educational program (participants from Umbria) or how they wish to include it in the future (participants from Sardinia).

While Middle School teachers (Umbria) were more focused on teaching active and sustainable citizenship to their pupils, i.e. concerning the 5Rs (refuse, reduce, reuse, repurpose, and recycle), High School ones (Sardinia) were more focused on specific items to give about agriculture and farm business, i.e. informatization, new technologies, the transformation of waste into resources. In this regard, the teachers' different goals are rooted in the different ages of students and the school's educational address.

- *Have you (or colleagues) ever had to refer to Circular Economy or its principles during your lessons?*

Middle school teachers replied that they are used to referring to them both in subjects such as Science, Geography, and Civic Education and when creating specific didactic experiences carried out by external resources, such as professionals from specific fields, such as Biology, Art, and Sanitation.

On the other hand, High School teachers reported that they do not specifically refer to Circular Economy because they need to gain the educational background in this topic they wish to get. Specifically, they ask for small theory and extensive practice training. Moreover, keeping on the discussions, they acknowledged that Circular Economy values are part of the farm and agricultural habits. Still, they recalled the need and the interest in deepening their

Skills in order to produce more knowledge suitable for the students, with specific connections to the labour market.

- *What are the best teaching strategies to adopt to communicate and convey the principles of the circular economy to pupils?*

All the participants agreed that activities promoted through the methodology are the most impactful. Moreover, they add it involves motivating students more than theoretical lessons.

Also, Middle School teachers explained how it is important to match CE principles and practices and/or examples as often as possible in curricular subjects, i.e. Geography, Science, etc., and in dedicated extracurricular activities, i.e. during workshops and/or class trips. They also stressed how, in schools, activities related to CE values are carried out at the free initiative of most teachers, while they would like to have curricular space and time for it. Agreeing with High School teachers, they underlined how specific funds should be available to implement activities on CE and Tinkering methodology on a deeper level.

Also, High School teachers reported the general need for their students to see the practical connection between what they learn at school and how they can use it. More practical educational tools must be implemented in order to help the students relate to the labour market standards and innovations. Their schools argued that teachers lack the technologies to work on the practical upskilling of students. They mentioned, i.e. Robotics.

- *How can pupils be made aware of the principles and values of the circular economy so that they become aware of them and can use them in their daily lives?*

Building on the previous question, Middle School teachers look for small practices pupils can embody and spread both among their peers and families, such as properly storing garbage, reducing the use of plastic, etc.

High school teachers aimed at presenting CE from a business perspective for developing fair and profitable markets. The great example they bring is the one of a wine industry they cooperate with, which proved to students how leftovers from wine production could be used for the brewery and fertilization.

None of the participants referred to the ethical human-to-human perspective of CE, and when acknowledging it, they should start including topics such as unfair resource distribution or unfair production chains in their educational activities.

- *How should teachers be more involved by schools or society, in general, to make them active players in transmitting the principles and values of the circular economy?*

At different levels, all teachers agreed on the need to implement:

- Specific training;
- External professional;
- Tinkering know-how;
- Curricular update (i.e. including in the economy program some Anthropology and Human Geography sections);
- Extra funds both for activities and tools;
- The connection between all previous aspects and the general principles of CE with the local reality.

High school teachers also added that students seem to be interested in something other than the topic. They added that it is hard for them to be involved at a general level during lessons.

- *What do you think are the strengths a teacher can have in transmitting the values of the circular economy to a class of young students?*

All the participants in the focus group agreed that teachers should be passionate about the topic to truly engage students and recall previously mentioned needs and interests as the first step to fostering quality content.

- *In your experience, what are the weaknesses or skills that could be improved in teachers' role of transmitting values related to the circular economy?*

All the teachers involved in the focus group agreed that with specific training for teachers and in the absence of funding for the activities, all the activities they can implement are merely based on personal interest and initiative during their class.

- *What should be the role of schools and teachers in transmitting the principles and values of the circular economy?*

In this regard, the participants agreed on how schools, as major educational spaces, are responsible for sustainability at large. School subjects should provide the theory of CE, while practical workshops should provide kids with learning games for embodying and disseminating CE habits.

MACEDONIA

Participants' information

The focus group was carried out in March 2023 by the organization Osnovno Uchilishte So Resursen Centar "Maca Gjorgjieva Ovcharova".

N. 5 people participated in the focus group, respectively, teachers with different disciplinary backgrounds and ages, which are summarized in the table below (table 2).

Table 2:

Profile	Name	Age	Country of origin	Education	Profession
Participant 1	Olgica	64	N.Macedonia	MA	Teacher
Participant 2	Mila	37	N.Macedonia	PhD	Teacher
Participant 3	Vesna	48	N.Macedonia	MA	Teacher
Participant 4	Persida	53	N.Macedonia	BA	Teacher
Participant 5	Ivana	36	N.Macedonia	MA	Teacher

Questions and discussion

- *Do you know what Circular Economy is? Can you give examples?*

Participant 1: the most spartan circular economy can be explained with an example of the life cycle of trees in nature. Trees grow, branch out, create leaves that fall in autumn, and create compost that feeds new trees, and in essence, it is an ideal natural circular system. The linear economy model is historically younger than the circular economy. It is a model based on "take, makes, consumes and throws away" - hence the adjective linear as if moving in a straight line. It starts with extracting resources, which are further processed with the hell of energy and labour to produce products that are sold, bought and then used as long as they function and finally treated as waste.

Participant 2: it is a change in the model in which resources are used, converted into products, and then become waste. A circular economy reduces the use of materials, redesigns materials, products and services to be less intensive and reclaims "waste" as a resource to produce new materials and products. For example, by recycling plastic, new plastic products are made.

Participant 3: I'm not sure, but I think it's a circular movement in a circle and economy, a reasonable allocation of funds.

Participant 4: use fewer new resources by making products last longer.

Participant 5: circular economy is oriented to nature as its role model. The circular economy concept aims to keep raw materials in a closed loop. In this way, resources are maximally used, the need for new ones is reduced, waste is avoided, and the life cycle of products is increased. In short, today's waste becomes tomorrow's raw material - the same as in nature. In this way, the circular economy differs from the current economic system, i.e. the linear system, in which products are manufactured, used and disposed of.

- *Have you (or colleagues) ever had to refer to Circular Economy or its principles during your lessons?*

Participant 1: I don't know about my colleagues, but I do. Before the advent of IT, we used hammers as a visual aid, and I often knew how to use both sides. I have organised a workshop for my students in cooperation with a primary school and a local business to make jewellery from unusable textiles, leather and metal wires. I have selflessly shared them with my students because our education system teaches children very little about the present and, even younger ones, what awaits them in the future if we all together do not take care of planet Earth.

Participant 2: Yes, during the lectures, I was guided by the principles of the circular economy, especially during class, the day of ecology and the day of the planet Earth. When we collect waste with the students intending to recycle it, we research the benefits of the circular economy and the possibilities for their application.

Participant 3: Yes, in the system of nutrition and energy expenditure.

Participant 4: Yes, I often use visual aids that we make ourselves from existing materials in the classroom.

Participant 5: Yes, sometimes I use circular economy during some lessons.

- *What are the best teaching strategies to adopt to communicate and convey the circular economy principles to pupils?*

Participant 1: the best strategy is to place small containers in the classroom from the youngest age to dispose of waste they create during teaching through practical application to educate. At the same time, the teacher should constantly emphasise that even trash can be further used. A new product can be obtained (for example, packaging for egg packaging from paper or making ornaments for the Christmas tree from old paper, etc. where the students will learn that they, as individuals, also leave waste. The teacher has a crucial role. The better he knows and practices the principles of a circular economy, the better he will be able to promote awareness of the importance of preserving a healthy environment.

Participant 2: the practical application of the circular economy, according to the possibilities, through the selection of waste for recycling and the reuse of the waste material, where it could be used (e.g. when working in workshops in the textile and leather profession at our school).

Participant 3: Practical performance on activities in nature.

Participant 4: through a personal example, let's show the students that we should create in harmony with nature without destroying it.

Participant 5: Mastered the basic concept of circular economy, understood limited resources, applied the business models of circular economy, and used systematic thinking in problem-solving.

- *How can pupils be made aware of the principles and values of the circular economy so that they become aware of them and can use them in their daily lives?*

Participant 1: I often say that children's behaviour is a consequence of adults. First are parents and then teachers. It is a fact that most of the adult population does not sufficiently understand and practice social responsibility. He feels everything outside his home is foreign, so he cares little about how, where and what he throws away. From here, many illegal landfills, polluted air, polluted river watercourses and soils, not thinking that crops are grown on the same ground, transferred to the plant, the fruit, which in turn ends up on our table. In the long run, however, we all pay the tax for such lack of care through health bills.

Participant 2: ongoing education, training, workshops, research, and visiting companies that apply circular economy are the basis for success.

Participant 3: Respect nature, save.

Participant 4: to show them the consequences of excessive use of natural resources.

Participant 5: include sustainability and circular economy topics and examples in curriculums at all levels, from broad perspectives to specific ones. For example, with younger age groups - discuss the 5R (refuse, reduce, reuse, recycle, rot) model and how to prevent waste in our daily lives. Circular company visits can be a part of class excursions at all levels. Senior levels can work on the circular economy meaning, model and business examples.

- *How should teachers be more involved by schools or society to make them active players in transmitting the principles and values of the circular economy?*

Participant 1: In institutions in the field of education, such as the Ministry of Education and Culture, where curricula are created, it is enough to insert a mandatory general education subject, such as social responsibility and a culture of healthy living, consisting of several modules.

Participants 2: if they are continuously trained and a sense of social responsibility is instilled in them, they will pass it on to their students.

Participant 3: to be trained in circular economy and to apply the acquired knowledge in teaching.

Participant 4: implement more lessons in the field of ecology and environmental protection.

Participant 5: to develop and reinforce cross-sector collaboration, including collaboration with youth organisations and the business sector to enhance coordinated efforts toward providing a broad range of complementary opportunities to formal education for young people to acquire and develop circular economy competencies, for example, non-formal learning, on-the-job training, etc. This can include internships in sustainable companies, company representatives' visits, company tours, and company challenges.

- *What do you think are the strengths a teacher can have in transmitting the values of the circular economy to a class of young students?*

Participant 1: it is essential to explain the principles with examples. I know from experience that sharing a personal example of a circular economy leaves the strongest impression on students. It is enough to share a personal example, such as that they initiated in their street that each household separately selects plastic packaging from the rest of the municipal waste to facilitate the work of street plastic collectors from a vulnerable category of citizens who thus feed the family.

Participant 2: The teacher is familiar with the concept and principles of the circular economy, applies them, and is socially responsible. Also, a teacher must advocate applying the principles of circular economy in the classroom and demonstrating good practices.

Participant 3: a vital point would be the desire of the teacher to attend training on the subject and transfer the acquired knowledge in teaching.

Participant 4: organising actions to show them how to get more with a circular economy.

Participant 5: Strong communication skills and interpersonal skills, active listening, ability to cooperate, and adaptability. Competence in engaging, being sympathetic, ability to simplify concepts and creativity.

- *In your experience, what are the weaknesses or skills that could be improved in teachers' role of transmitting values related to the circular economy?*

Participant 1: only with mandatory education of all teachers. A small number of teachers informally, that is, educate themselves, research and expand their knowledge about all social changes purely from the general culture. Somehow, the circular economy concept is perceived as something only economists should know, forgetting that all sciences are in mutual correlation. Everyone who calls themselves an intellectual should experience the principles of circular economy as a culture of social responsibility and living in a healthy environment.

Participant 2: My main weaknesses are 1) insufficient education about the topic and 2) insufficient motivation to implement good practices through school institutions.

Participant 3: lack of interest, lack of time, too much administration.

Participant 4: needs more lessons in the field of ecology classes to convey the values of a circular economy.

Participant 5: There is a lack of regulations governing legal competition among companies. Lack of environmental awareness on the part of suppliers and clients. Economic barriers and access to financing

- *What should be the role of schools and teachers in transmitting the principles and values of the circular economy?*

Participant 1: they must be promoters to raise awareness of the importance of the circular economy.

Participant 2: act to promote the importance of the circular economy, both for human beings and nature.

Participant 3: the mentoring role, guiding and monitoring values and outcomes.

Participant 4: building habits for reuse and recycling of materials used in school.

Participant 5: Schools and universities must teach theoretical knowledge about the circular economy and also support the cultivation of a sustainability mentality and eco-responsible citizenship outside the classrooms and lecture halls.

- *Do you know what the tinkering methodology is? If yes, do you use it, and how?*

Participant 1: Yes, I use this method with students to make dresses from recycled materials such as paper towels and toilet paper rolls, egg cartons, cellophane, and other found materials.

Participant 2: yes, in various fiscal policies.
Participant 3: No, I'm not familiar with the expression.
Participant 4: No, I don't.
Participant 5: Yes, I use it in problem framing, using technology for new applications and making design decisions.

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FINLAND

Introduction

The focus group aimed to explore how teachers from various schools in Vantaa perceive the Circular Economy (CE) and its potential incorporation into educational frameworks. This group, facilitated online, comprised five teachers from diverse educational backgrounds, providing a multifaceted perspective.

Awareness and Integration of CE in Lessons

It was evident from the discussions that there's a universal awareness of CE principles among the participating educators. Their familiarity spanned from rudiments like recycling and upcycling to more complex elements like sustainable production and consumption. However, the depth to which CE is integrated into their lessons varies. While some had only skimmed the surface, discussing it during sustainability units, others embedded it as a foundational component in subjects, especially in environmental sciences.

Teaching Strategies and Student Engagement

The range of teaching methodologies proposed by the participants was vast, reflecting their diverse backgrounds and student age groups. While hands-on activities, field trips, and project-based learning were frequently mentioned, innovative approaches such as storytelling, role-playing, and the integration of animated videos are worth noting. These strategies convey knowledge and cater to different learning styles, ensuring comprehensive student engagement.
Moreover, the emphasis on real-world application was unmistakable. Teachers believed in moving beyond theoretical knowledge, advocating for projects that mirrored real-world challenges, thus preparing students for practical problem-solving while fostering environmental consciousness.

Teacher Involvement and Support

There was a palpable call for enhanced support for educators in this domain. From the need for targeted training to providing relevant resources, teachers sought backing from educational authorities and institutions. Regular workshops, collaborative projects, and a shared repository of resources were among the suggestions.

Strengths, Challenges, and Improvement Areas

While the teachers showcased a commendable commitment to sustainable living and a proclivity to adapt and integrate new knowledge, they also acknowledged challenges. One prominent concern was navigating the overwhelming expanse of information on CE and filtering what's age-appropriate and curriculum-aligned. The delicate act of infusing passion while ensuring factual accuracy was another challenge.

Role of Schools

An overarching theme was the imperative role schools play. Schools, as institutions, should not merely be venues of instruction but exemplars of sustainable practices. Integrating CE into their operations and values can provide students with a living model of the principles being taught.

Conclusions

The focus group provided valuable insights into the current state of CE education in Vantaa's schools. While awareness exists, there's a pressing need for structured support, resources, and training for teachers to mould future eco-conscious citizens effectively. As society increasingly gravitates towards sustainability, educational institutions must be at the forefront, championing the change.

ASSESSMENT

Introduction

About the evaluation of the data collected during the research phases, using a questionnaire, collection of good practices and focus groups, in this chapter, we will try to understand what needs emerging in relation to the different national contexts and compare them to see if there are any points of contact from which a unified strategy can be drawn up that takes into account the strengths and weaknesses of all the partners involved.

We will draw out the results of our research by dividing it into different paragraphs:

a) *Desk research results and considerations.*
b) *Focus group findings: meeting teachers' needs.*
c) *Assess teachers' needs regarding green competencies: from the local towards the GreenComp framework.*

Desk research results and considerations.

Best practices

As for the Desk Research, especially for the part related to the Best Practices collection, the consortium needed help finding relevant practices to be replicated in the Circular Economy and Tinkering methodology field. Not so many of those found in the research phase were indeed implemented in schools and the educational field.

However, if, on the one hand, the partner consortium managed to find good and replicable practices in the field of circular economy and sustainability, on the other hand, it was pretty difficult to find practices that explicitly referred to the tinkering methodology. Moreover, the kind of best practices collected suggests a lack of Circular Economy and Tinkering methodology training regarding teachers and educators in schools.

With regard to the practices collected, we believe that - although there is a thematic gap with the Tinkering methodology in schools - there are good examples that can be replicated or at least serve as inspiration for the target group.

One of the key aspects is that all collection practices are replicable, modifiable and adaptable to different educational contexts in order to allow teachers and educators to customise the implementation of practices.

Circular Economy knowledge at the participants' level

The majority of respondents have an average knowledge of the topic that mainly comes from sources external to educational institutions, such as TV news, magazines, other people and, in part, training courses. The situation was quite similar both for Italy and Macedonia.

On the other hand, coming to Finland, the majority of participants claimed to know the meaning of the expression "circular economy", suggesting a relatively high level of awareness about the concept among the respondents. The participants indicated that their knowledge came from specialized training, such as university courses or training programs. This implies that a significant portion of the Finnish respondents have received formal education or professional development related to the circular economy, which provided them with a more in-depth understanding of the topic.

Circular Economy knowledge at national and professional field level

The majority of Italian respondents consider the popularity of the Circular Economy quite low, and, in general, the Circular Economy knowledge at the country level could be better than some other average. However, the majority of participants claim that there are countries that are working harder in the attempt to spread Circular Economy values, and a good number believe the Italian situation is typical of other European countries.

As for Finland, the majority of respondents indicated that they perceive schools as the primary source of knowledge about the circular economy in comparison to other countries. Overall, the data indicates a positive environment for Circular Economy knowledge at the national level in Finland, with schools playing a significant role in educating the population.

What emerged from the results is that there is a need for continuous efforts to ensure comprehensive and effective transmission of circular economy principles and values,

potentially through a mix of theoretical and practical approaches. It is important to address the knowledge gaps and varying levels of engagement across different professional sectors to foster a more uniform adoption of circular economy practices throughout the economy and society.

Circular Economy knowledge in schools

The tendency in Italy is to consider the effort of schools not sufficiently satisfying in spreading the values of the Circular Economy and that it should be one of the places where the training in this sense should be significantly improved, especially through the combination of theoretical and practical skills. The Italian participants suggested that practical workshops and events are the best way to engage the pupils. They also claimed the importance of involving parents and families in the process of training about Circular Economy values.

As for Finland, the survey respondents strongly agreed that schools should be a primary place for training future generations in the values and principles of the Circular Economy. Most respondents believed that schools should provide education about the circular economy. They expressed the view that theoretical knowledge and practical information about the circular economy should be incorporated into school curricula.

The Finnish respondents demonstrated enthusiasm for the role of educators in shaping future generations' understanding of the circular economy and highlighted the importance of incorporating circular economy education in schools and the need for teachers to acquire the necessary skills and knowledge to teach this subject effectively.

In general, the respondents from all countries indicated that practical knowledge and a combination of theory and practice should be emphasized in schools. Initiatives such as workshops, events, etc., that actively engage students and pupils are considered more efficient than solely theoretical sessions. These are considered necessary and fundamental, but they need to be conveyed together with keen attention to the practical side of teaching.

Familiarity with the Tinkering Methodology

As for the Finnish responses, the majority claimed to know the meaning of the expression.

"Tinkering Methodology" indicates a high level of familiarity and understanding.

However, the Finnish situation does not reflect that of countries such as Italy and Macedonia, where the knowledge of this practice is still poor and not widespread enough, neither at the school level nor in terms of general culture. As pointed out elsewhere, this fact was particularly evident in the collection of good practices, which proved particularly difficult in this respect.

In this sense, comparison between partners can be particularly beneficial in terms of support and exchange of good practices from different situations to achieve common goals.

Identified skills and knowledge needed for teachers

All the respondents from all the consortium countries were optimistic about the role of teachers in disseminating the values of the Circular Economy, although they claimed they should be adequately trained – both theoretically and practically – through specific training and workshops. Also, they express their support for teachers, saying that they should work to engage their pupils through a proactive attitude during classes to show and invite students to practice the values of Circular Economy on a daily basis.

Focus group findings: meeting teachers' needs.

The Focus Groups were particularly helpful in identifying the teachers' needs on Circular Economy and Tinkering methodology potential teaching activities. Teachers were asked what they think of the potential of non-formal education and Tinkering; they needed clarification, as they needed to learn the meaning of these terms. Besides this, since the first words they used, it looked clear how they asked for non-formal methodologies to be implemented with experts to foster a Circular Economy and sustainability-related values. Especially, Middle School teachers recognized the importance of practical activities and workshops to raise awareness of CE in an impactful and successful way.

High school teachers did not explicitly mention the need for workshops or recreational activities, but they stressed how the activities that should be implemented need to be extremely practical and related to the labour market. They all insisted on the importance of

field education for teachers and expressed their interest in this specific K2 project to get some, together with asking their schools to be included in the follow-up of this focus group.

Concerning the need for extra funds, especially stressed by high school teachers for investing in the optimal technology they assumed they needed, they were clearly referring to governmental institutions.

Assess teachers' needs regarding green competencies: from the local towards the GreenComp framework.

The importance of teaching sustainability

From the data collected during the research phase of the Eco-Future project, there is a need to implement an upskilling pathway programme for teachers to strengthen their key competencies and profiles in dealing with environmental and green issues. In this regard, a fundamental tool for constructing a valid, up-to-date pathway that is adapted to the needs of the target group but takes into account the contemporary context is the *GreenComp. The European sustainability competence framework* (2022), i.e. the report drawn up by the European Commission based on the identification of competencies in the field of education for teaching sustainability.

One of the most relevant aspects that we have understood from the data collected concerns the need to be clear about what sustainability and the circular economy are to define the contours of the teaching objectives clearly. Only in this way can the professionals master the knowledge related to this field acquiring sustainability competencies. As we find in the *GreenComp,* the acquirement of competencies leads toward the empowering of whoever is learning to be active and proactive in the interested field:

> A sustainability competence empowers learners to embody sustainability values and embrace complex systems in order to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures (EC, 2022; p. 12).

In this sense, the power related to the teaching-learning sustainability competencies is

strictly related to their transformative power, i.e. the capability to change our perspective, minds and habits, encouraging the critical thinking attitude toward our role in our environments (EC, 2022; p. 12).

Knowledge is often seen as something neutral. However, knowledge is a powerful instrument of individual and collective emancipation. Knowledge allows one to become aware of his/her condition and that of the community and environment they are part of.

In this regard, the importance of teaching sustainability strictly relies on the need to change our habits toward the environment we inhabit to become aware of the strong interdependence of our existence on the system in which we live.

Teaching and learning both theoretical and practical sustainability skills are and will be increasingly fundamental to rewriting the relationship between us and the world, especially when climate change is a real problem impacting our daily existence.

> Learning for environmental sustainability aims to nurture a sustainability mindset from childhood to adulthood with the understanding that humans are part of and depend on nature. Learners are equipped with knowledge, skills and attitudes that help them become agents of change and contribute individually and collectively to shaping futures within planetary boundaries (EC, 2022; p. 13).

From the local toward the GreenComp framework

In order to validate valuable, up-to-date and spendable competencies in the field of sustainability, it is necessary that the four macro areas of competence are taken into account. For this reason, the consortium decided to address the shortcomings that emerged from the data collected through the development of a training course that will start from the comprehensive knowledge of the Circular Economy and Tinkering methodology and the GreenComp areas and competencies, specifically:

1) **Embodying sustainability values:**

   COMPETENCES:

   - *Valuing sustainability*
   - *Supporting fairness*
   - *Promoting nature*

2) **Embracing complexity in sustainability:**

   COMPETENCES:

   - *Systems thinking*
   - *Critical Thinking*
   - *Problem Framing*

3) **Envisioning sustainable futures:**

   COMPETENCES:

   - *Futures literacy*
   - *Adaptability*
   - *Exploratory Thinking*

4) **Acting for sustainability:**

   COMPETENCES:

   - *Political agency*
   - *Collective Action*
   - *Individual Initiative*

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INTRODUCTION TO TINKERING METHODOLOGY AND ITS USE WITH CHILDREN

Tinkering is a learning approach based on Non-formal Educational patterns and strategies and, originally, it has been conceived to engage people with STEM learning (related to science, technology, engineering and mathematics).

This methodology builds on ideas in inquiry-based pedagogy, stressing participants' critical thinking and practical approach and exploiting some of the most engaging and motivational elements of learner-centred, immersive, and hands-on learning approaches. In this regard, Tinkering consists of taking an item, using it, improving it and experimenting with it without any structure (Museo della Scienza, 2023).

Tinkering can enhance children's enthusiasm towards objects they are not familiar with. More specifically, when a child is given a toy, a computing device, a robot, or anything new, the first stage approach is to investigate “what happens if”, working the children’s mind, stimulating their creativity and the learning process through curiosity (Kubo, 2021).

Tinkering aims to develop critical thinking, creativity, collaboration, problem-solving, communication, responsibility, self-confidence, digital literacy and entrepreneurship skills. Tinkering is considered a computational thinking approach that can encourage 21st-century skills to emerge fully.

21st Century 4 x C's - these apply to a wide range of scenarios and subjects.

Critical Thinking	Creativity	Collaboration	Communication
Exploring and finding the solutions to the problems they encounter	Developing creativity to use their imagination and think outside the box!	Working with others either in pairs or groups to develop teamwork.	Talking through their findings, their ideas, listening to others and developing ideas from talking.

Image source: KuboEducation

The Tinkering approach to education lends itself to NFE models of learning. In this regard, the resources of NFE can be used to the advantage of the Tinkering methodology to be put to good use when it comes to disseminating new concepts, testing values and stimulating learning by doing in young children.

NFE «refers to planned, structured programs and personal and social education processes for young people designed to improve a range of skills and competencies outside the formal educational curriculum» (Council of Europe, 2023). Some of its main characteristics make it ideally accessible to everyone, group-oriented, an organised process with educational objectives, participatory, learning-centred, devoted to learning life skills and preparing for

active citizenship, holistic and process-oriented, based on experience action and organised on participants' needs (Council of Europe, 2023).

All the activities promoted by Tinkering are always in the form of a game or challenge and must be carried out in groups. The main activities include building or breaking down objects, exploring materials or mechanical elements, creating original artefacts or triggering chain reactions.

Tinkering aims to make various objects using recycled materials readily available at home. Boxes, glasses, sheets of paper, pieces of wood, wire, and plastic wrapping are just some of the 'ingredients' that may be needed to get to work. So many things can be built: electric circuits, small robots, mechanical toys, marble tracks, chain reaction mechanisms, and sculptures (Metodologie Didattiche, 2023).

In particular, the crossover between these two educational approaches can foster processes such as:

- Performing and enhancing group dynamics;
- Social inclusion and dialogue between diversities;
- Construction of a safe, non-judgmental and non-performance-based learning environment;
- Stimulation of different areas of the child's intelligence;
- Learning of practical skills;
- Development of self-esteem and autonomy in performing exercises.

In this manual, you will have the chance to experiment with Tinkering by implementing the workshop that has been designed for the Eco-Future Training Format. More specifically, the Topic 2 is all about Tinkering Methodology and NFE approach and consists of some workshop guidelines to work with and learn more about this innovative method.

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ECO-FUTURE TRAINING FORMAT

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INTRODUCTION TO THE ECO-FUTURE TRAINING FORMAT

As you will see, this Training Format has been designed to support teacher training on topics related to the sustainability and environmental skills.

The Eco-Future Training Format aims at providing practical tools to make the knowledge of sustainability values fun and sharable, in the context of an upskilling pathway for teachers and children educators. In this sense, the format has been designed to provide educators with a toolbox to stimulate their own learning process through the topics of Circular Economy, Tinkering Methodology, GreenComp framework and Co-Design, but keeping an eye to children's needs in terms of skills gap. For this reason, you will also find modules that stresses the realisation of Sustainable Cartoons and Storyboards, together with Co-Design sessions to stimulate brainstorming among participants.

However, this material can be reused and adapted to different needs and target groups. The workshop, which aims to fulfil practical functions while also conveying theory, can be adapted to the needs of teachers, educators and every adult who are interested in training or enhancing their skills in these areas.

The format presented here, therefore, serve as a model for inspiration and we hope that it will be ‘contaminated’ through others’ people needs and background to be put to good use.

There are 10 main topics in the Training Format and they are, respectively:

- *Introduction;*
- *Circular Economy:*
- *Tinkering Methodology and NFE with children;*
- *GreenComp Area 1: Embodying Sustainability Values;*
- *GreenComp Area 2: Embracing Complexity in Sustainability and related competencies;*
- *GreenComp Area 3: Envisioning Sustainable Futures;*
- *GreenComp Area 4: Acting for Sustainability;*
- *Co-Design with children;*
- *Storyboard creation for Cartoons and Sustainability;*
- *Evaluation.*

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TOPIC 1: INTRODUCTION

OVERVIEW

This introductory session explains the aim and scope of the ECO-FUTURE project and the Training format. During the in-person Training, the activities' structure and contents will be presented to the participants.

In this first phase, the educator will support participants in understanding the training format's main objective. However, the educator must not only try to briefly explain the purpose of the ECO-FUTURE project and Training Format, but they should also focus on how participants will learn about Circular Economy, Sustainability and Tinkering methodology skills.

The very first part of the session will be dedicated to briefly presenting the Training Format structure. This presentation aims to orient the participants to the very scope of their Training: attend an upskilling pathway on Circular Economy, Sustainability and Tinkering methodology to be used in their work with the youngster. The educator must remember that the Training must function as a learning tool for teachers - and indirectly for students. Participants must become vectors and actual agents of change for sustainability.

In this context, sustainability education is considered a transformative learning practice as it encourages teachers and children to question their perspectives, beliefs, and behaviours and challenges the subject's and human being's traditional role in its environment. Then, the scope of this learning framework is to support the process of acquiring skills to make concrete use of them by leading to the production of concrete actions and transformations.

As framed in the *GreenComp, according to the European sustainability competence framework* (2022), «sustainability competencies empower learners to embody sustainability values and embrace complex systems, to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures».

As the training session will be based on non-formal education workshops, most of the sessions, including the theoretical ones, will involve mutual discussions and brainstorming between participants. They will share their experiences, skills, and expectations about the training format. Participants are encouraged to engage with the course contents and exchange personal experiences and good practices related to the workshop topic.

The introductory session is part of the theoretical ones. As anticipated above, this will include an in-depth analysis of the key competencies the target group will learn during the training format activities. In this sense, the educator must be prepared for the training format's whole content and focus on the competencies to be acquired by the participants. Also, the educator must always keep in mind that the main goal of this training course is to provide the target audience with up-skilling pathways regarding the field of Circular Economy, Sustainability and Tinkering Methodology.

Moving to the key competencies, the educator must acknowledge the GreenComp framework, where these are carefully described, together with taking into account those skills that will be boosted through the dedicated modules of this training format.

More specifically, these will consist of the following:

- **Theoretical competences** on:
    a. Circular Economy
    b. Tinkering Methodology
    c. Non-Formal Education

The theoretical competencies presented during this session will consist of an overview of which competencies the participants will acquire by briefly explaining what they consist of. The presentation must consider the definition and an example of practical application in the school context.

- **Practical skills**, namely**:**

    ➢ **GreenComp framework related**

    a. Valuing Sustainability
    b. Supporting fairness
    c. Promoting nature
    d. System thinking
    e. Critical thinking
    f. Problem framing
    g. Futures literacy
    h. Adaptability
    i. Exploratory thinking
    j. Political agency
    k. Collective Action
    l. Individual initiative

- **Other practical skills**

  m. Co-design process and methodology
  n. Storyboard creation

Concerning the practical skills, during the introductory session, they must be briefly presented through a definition and practical application of the competence.

When introducing the theoretical and practical competencies, the educator must always refer to the session in which these will be developed.

AIMS

- Give background on the project
- Explain the scope of the Training Format
- Present to the participants the theoretical and practical skills the target group will acquire
- Inform about the structure and contents of the activities.

EXPECTED OUTCOMES

- The target group is informed about the aim of the ECO-FUTURE and about the scope of the Training Format.
- The Target group acknowledges the significance of sustainability education, as framed in the GreenComp document.
- The Target group acknowledges which skills they will acquire and develop during the Training.
- The target group relates to the skills by discussing with their peers about previous experiences, actual skills and expectations about the Training Format.

DURATION

2 hours

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TOPIC 1: INTRODUCTION	
Learning Outcomes	• Acknowledge the aim of the ECO-FUTURE project. • Acknowledge the aim of this Training Format. • Be informed about the skills that will be developed through the TF. • Understand how the activities will be structured and scheduled.
Group Size	20 + 1 (Trainer)
Duration	2 hours
Materials	• PPT presentation • Projector
Preparation	• The educator will be asked to present the slide about the project and TF scope. • The educator will explain which skills will be needed by the target group in the field of CE and Tinkering and focus on how they will develop them during the TF. • The educator will engage the participants by asking them about their previous experiences, actual skills and expectations.

Description/Steps	1) The Hosting Organisation present themselves and briefly ask the participants to introduce themselves to the others (30 min) 2) The educator starts presenting the slide about the project, TF scope and sustainability education (max 15 min) 3) The educator stops and asks the participants if they have previous experiences and skills they can relate to the fields of Circular Economy and Tinkering Methodology (30 min). 4) The educator presents the slide about the skills that will be acquired during the Training and the activities that will be developed to mature these skills. (max 15 min). 5) The educator stops and asks the participants why they chose to participate in the TF and their expectations about it (30 min).
References	Bianchi, G., Pisiotis, U. and Cabrera Giraldez, M., GreenComp The European sustainability competence framework, Punie, Y. and Bacigalupo, M. editor(s), EUR 30955 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-53201-9, doi:10.2760/821058, JRC128040.

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TOPIC 2: CIRCULAR ECONOMY

OVERVIEW

This session will focus on Circular Economy as a core concept of this Training. The session will be developed in two phases: 1) in the first, the educator will explain what Circular Economy is from a theoretical perspective; 2) in the second, the educator will deepen on best practices in the field of Circular Economy to give practical insight and inspirations from tested experiences of Circular Economy teaching.

As per the theoretical part, the educator will focus on the definition of Circular Economy and explain the importance and the need for such an approach in contemporary European economies.

AIMS

- Provide the participants with a theoretical background in Circular Economy.
- Inform the participants about best practices in the field of Circular Economy applied to schools.

EXPECTED OUTCOME

- The participants acknowledge what Circular Economy is
- The participants understand the importance of the Circular Economy

DURATION

2 hours + 10 minutes evaluation

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CIRCULAR ECONOMY

What is a Circular Economy? The European Parliament defined it as «a production and consumption model involving sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended» (European Parliament, 2023).

The goal of adopting Circular Economy practices is to reduce waste production by encouraging behaviours supporting recycling practices, especially the reuse or transformation of generally wasted products into new resources.

Circular economy was born to contrast the linear model of production and consumption for which products are created to be used and wasted without considering the second life that certain objects can have after their main/first use. Not only does the Circular Economy push towards the reduction of consumption and the conscious purchase and use of new products that are placed on the market, but it also encourages people to consider alternative uses for objects that were created for another purpose or that in the traditional economy are considered waste objects.

The Circular Economy, therefore, stimulates the reuse of objects in a creative sense and only considers waste and recycling (understood as responsible waste disposal) as a last resort.

Although waste-related issues should primarily be addressed by policies at the institutional level, on the other hand, raising awareness of the value and waste chain of products can be extremely advantageous. Actions from below, in fact, push producers to change their production model by adapting more easily to consumption trends.

In this regard, sustainability education in the Circular Economy is fundamental to accompany the younger generations in the process of awareness-raising that passes above all through the adoption of daily practices.

What are the actual effects of the Circular Economy? Mainly, this can be summarised as follows:

- Reduce resource exploitation;
- Reduce raw materials dependence;
- Reduce habitat disruption and loss;
- Reduce CO2 production;
- Increase competitiveness and stimulate innovation.

Adopting circular practices of consumption really impacts the environment and biodiversity conservation. In this sense, the Circular Economy reduces resource consumption at multiple levels and supports safeguarding natural habitats.

Along with reducing natural resource exploitation, adopting Circular Economy practices lowers greenhouse gas emissions (European Parliament, 2023). More specifically, industrial processes and product use are responsible for 9.10% of greenhouse gas emissions in the EU, while the management of wasted products accounts for 3.32%.

For these very reasons, a change in consumption and production behaviours will support using more durable products, considering their impact on the environment. As mentioned above, firms and companies are very sensitive to customers' behaviours and choices. Therefore, changing attitudes toward consumption can lead producers to fabricate more durable and sustainable products.

Also, from the economic perspective, favouring products with a more sustainable life cycle can be an opportunity for innovation, growth, and competitiveness in the market (European Parliament, 2023).

Together with explaining the theoretical background of Circular Economy, the educator will present some examples of good practices in Circular Economy applied to the school's environment. Most existing projects in this field concentrate on raising awareness by creating pathways for the pupils. These aim to improve their understanding of waste value, recycling and reuse practices and implement practical workshops that combine play and learning dimensions. Some projects propose reusing materials that are generally discarded, such as bottles, paper rolls, etc., to create games for children to use. Others, however, introduce the concept of gamification into waste sorting practices to encourage the sedimentation of sustainable practices.

TOPIC 2: CIRCULAR ECONOMY	
Learning Outcomes (Purpose of the exercise Explain why this exercise is implemented.)	• Basic theoretical knowledge of Circular Economy: definition, mechanism and role in contemporary economics. • Understand the applicability of the Circular Economy. • Learn transferable and replicable practices.
Group Size (Number of participants)	20 participants + 1 trainer
Duration	2 hours + 10 min evaluation
Materials (What is necessary for the trainer/facilitator and participants to carry out the exercise)	• Projector • PPT presentation • Video link • Post-it/online board • blackboard sheets • Markers • Blank sheets
Preparation	• The educator needs to be prepared for the theoretical part that they will present through a PPT and video (linked above). • The educator needs to prepare a live online board/use post-it. • The session foresees group activities, games and discussions, so they need to stick to the target group and always focus on the needs to be targeted by its workshop. • The educator must prepare a PPT about 3-5 Best Practices to be presented and discussed among the participants.

Description/Steps	**INTRODUCTION TO CE (60 min)** • The educator asks the participant if they have ever used a product in a way other than that for which it was designed, referring to the time when that product was no longer helpful in performing the function for which it was created. The Trainer also asks if they think they could do more in order to reduce waste through reuse practices (15 min). • The Trainer plays a video about the Circular Economy (https://multimedia.europarl.europa.eu/en/video/x_V007-0034). • The educator shows PPT slides with the definition of circular economy and the difference between the linear model of production-consumption (15 min) • The educator asks the participants to reflect on the pros and cons of adopting CE practices. The participants are asked to add them to an online board/post-its that will be live projected in the class (15 min). • The educator invites the participants to discuss the results of the exercise, especially reflecting on the urgency of a CE approach (15 min). **PLAY WITH CIRCULARITY (30 min)** • The Trainer asks the participants to choose 5 precise items (e.g. plastic bottles, pair of jeans/fabrics, food cans, tyres, furniture) that, according to them, are among those most wasted. The Trainer writes down the 5 items. • Participants are divided into 4 groups. • The Trainer starts by naming the first object and asks the groups to make a list with all how that object can be reused. It creates a timer of 2 minutes. When the timer goes off, the Trainer collects the sheets, reads the reuse modes aloud and awards 1 point to the group that found the most. He continues in this way until all 5 objects have been discussed and a winner is reached.

	BEST PRACTICES ON CE (30 min) • The Trainer presents 3-5 Circular Economy BP applied to schools (15 min). • The Trainer asks the participants what they think about the BP regarding replicability in their schools and among pupils. The educator stimulates the participants to consider how the BP could be implemented to be more effective in impacting the school community (15 min).
Learning Check/Evaluation	The Trainer asks the following questions to stimulate a group discussion: • Do you think CE is important? • Do you think CE has a role in the future approach toward consumption? What are the risks of keeping a linear model of consumption? (10 min)
References	European Parliament, 2023. Circular economy: definition, importance and benefits. Available at: https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits?&at_campaign=20234-Economy&at_medium=Google_Ads&at_platform=Search&at_creation=RSA&at_goal=TR_G&at_audience=circular%20economy%20principles&at_topic=Circular_Economy&at_location=IT&gclid=Cj0KCQjwnrmlBhDHARIsADJ5b_l9gYVXDNNq3pXsEEkL3v08sMGqsGfaZr6ptiaRm-HpDynHvVSRAi4aApZCEALw_wcB [Accessed the 12/07/2023].

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TOPIC 3: TINKERING AND NFE WITH CHILDREN

OVERVIEW

In this session, the educator will introduce the participants to the concept of Tinkering to be used as a methodology for teaching. The session will delve into both theoretical contents (that can be found in the previous chapter, namely: *Introduction To Tinkering Methodology And Its Use With Children*) and practical activities.

The session aims to explain not only what Tinkering is but also its peculiar approach to education. Furthermore, in this session, the tinkering methodology will be addressed concerning the learning of the youngest children to support teachers in understanding how to use this educational approach during their schooling.

The tinkering methodology will be related to non-formal education (NFE), which will be used as a supporting methodology to convey Tinkering in children, but that can be adapted to every stakeholder interested in the topic.

AIMS

- Introduce the participants to the Tinkering methodology.
- Support the teachers in understanding the learning opportunities associated with Tinkering and children's education.
- Provide participants with NFE tools to be used with children.

EXPECTED OUTCOME

Teachers attending the session understand the Tinkering methodology and can apply it autonomously in the school context with their pupils. Teachers become aware of the potential of the Tinkering approach and the use of NFE in teaching notions and core values of the Circular Economy field.

DURATION:

2.5 hours

TINKERING AND NFE METHODOLOGY	
Learning Outcomes (Purpose of the exercise Explain why this exercise is implemented)	• Participants are familiar with the concept of tinkering. • Participants can apply it to the school context in which they work.
Group Size (Number of participants)	20 participants + 1 trainer
Duration	2.5 hours
Materials (What is necessary for the trainer/facilitator and participants to carry out the exercise)	• PPT presentation • Projector • Blank sheets • Markers
Preparation	• The educator needs to be prepared about the Tinkering Methodology that they will present through a PPT. • The educator needs to present a PPT about BP in Tinkering. • The educator has to involve the participants in a game through which their peers prepare activities to be submitted to their peers, testing the tinkering methodology. They need to ensure collaboration and efficacy of the activity among peers.

Description/Steps	**DELVING INTO TINKERING METHODOLOGY (30 min)** • The educator presents the Tinkering Methodology definition through a PPT (15 min). • The Trainer asks the participants if they have ever used the Tinkering Methodology in class or if they have ever learned something through this methodology (15 min). **TINKERING METHODOLOGY BP (35 min)** • The educator presents 3-5 Tinkering-related BP in a PPT (15 min). • The Trainer asks the participants what they think about the practices regarding replicability and some ways of implementing them (20 min). **TESTING AND TINKERING (75 min)** • The educator divides the participants into 4 groups. They display the table with skills that can be developed through the tinkering methodology. Every group chooses one skill (10 min). • Each group must prepare an activity based on the tinkering methodology to develop the chosen competence and submit it to the other groups (40 min). • The groups will now work 2 by 2. Two people from each group will have to explain the activity to the other and follow the participants as they perform it. Two other people from every group will have to assess the strengths and weaknesses of the activity and whether it was carried out correctly and according to the principles of the tinkering methodology (25 min).
Learning Check/Evaluation	The Trainer asks the following questions: • What do you think are the strengths of the Tinkering methodology? • What could be the benefit of using them in classrooms? (10 min)

References	

- Council of Europe, 2023. *Non-formal Education*. Available at: https://www.coe.int/en/web/european-youth-foundation/definitions.
- Kubo, 2021. *What is tinkering?* Available at: https://kubo.education/tinkering-and-kubo/
- Metodologie Didattiche, 2023. Tinkering. Available at : https://www.metodologiedidattiche.it/2017/12/09/tinkering/.
- Museo della Scienza, 2023. *Tinkering.* Available at: https://www.museoscienza.org/en/education/tinkering.

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TOPIC 4: GREENCOMP AREA 1 - EMBODYING SUSTAINABILITY VALUES

OVERVIEW

This chapter introduces the topic of GreenComp, *The European Sustainability Competence Framework*, and defines the GreenComp Area 1: Embodying Sustainability Values.

In this chapter, we will focus on defining what GreeComp is and specifying its usability and transversality. Then, we will analyse the GreenComp Area 1 and introduce the skills indicated as part of the Embodying Sustainability Values group, namely valuing sustainability, supporting fairness and promoting nature.

Below, you will find the implementation workshop concerning learning the skills related to these two topics, developed with a Non-Formal Education methodology.

AIMS

- Introducing the GreenComp framework to participants;
- Analysing the GreenComp Area 1 and related competencies;
- Develop GreenComp Area 1 competencies in Embodying Sustainability Values, namely valuing sustainability, supporting fairness, and promoting nature.

EXPECTED OUTCOME

By the end of the workshop, participants will:

- gain a comprehensive understanding of what GreenComp is, its purpose, and its role in promoting sustainability competences;
- recognise the GreenComp Area 1 skills;
- develop sustainable competencies of the GreenComp Area1;
- value and apply sustainability competencies belonging to the GreenComp Area 1.

DURATION:

- 2 hours

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GREENCOMP AND GREENCOMP AREA 1

GreenComp can be understood as a comprehensive reference framework for sustainability competencies. It serves as a structured and widely accepted model for defining and developing the essential competencies required for individuals to live, work, and act sustainably. In this regard:

> *GreenComp responds to the growing need for people to improve and develop the knowledge, skills and attitudes to live, work and act sustainably* (Bianchi et Al., 2022).

GreenComp aims to support European citizens to develop a sustainability-based mindset, especially by supporting acquiring knowledge and skills in the field. According to this, GreenComp serves as a valuable tool for educators, learners, policymakers, and anyone interested in sustainability.

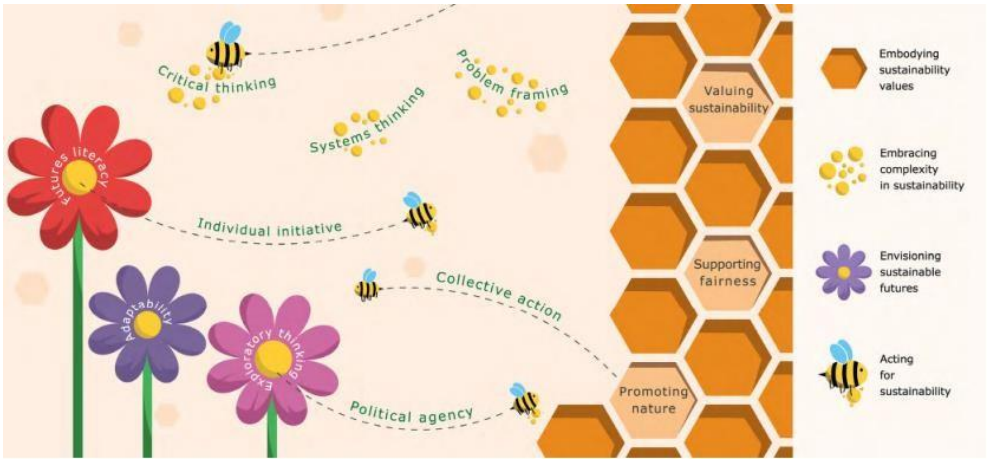
More specifically, GreenComp was designed to support educational and Training programmes for lifelong Training. For this reason, it has been thought for all ages and all backgrounds interested who aim at becoming systemic and critical thinkers, together with developing their agency related to sustainability and the care of our planet (Bianchi et Al., 2022).

The GreenComp framework, which is responding to a practical need called by the European Green Deal, consists of 4 working areas made of 12 competencies:

- **Area 1**: **Embodying Sustainability Values**
  - *valuing sustainability*
  - *supporting fairness*
  - *promoting nature*
- **Area 2: Embracing Complexity in Sustainability**
  - *systems thinking*
  - *critical thinking*
  - *problem framing*
- **Area 3: Envisioning Sustainable Futures**
  - *futures literacy*
  - *adaptability*
  - *exploratory thinking*

- **Area 4: Acting for Sustainability**
  - *political agency*
  - *collective action*
  - *individual initiative*

While there are 12 distinct competencies within GreenComp, there is no hierarchy among them. All competencies are considered equally important, and learners are encouraged to develop proficiency in all of them. GreenComp recognises the holistic nature of sustainability, where all competencies contribute to a comprehensive sustainability mindset.



GreenComp-related skills. Source: European Commission, 2022.

Speaking about the first GreenComp Area, this is about encouraging the reflection on personal values and worldviews, challenging them in terms of sustainable and unsustainable alternatives and values. Moreover, «this area advocates equity and justice for current and future generations while supporting the view that humans are a part of nature» (Bianchi et Al., 2022).

For this reason, GreenComp Area 1 – Embodying Sustainability Values challenges the idea that knowledge and habits are neutral, objective and value-free. The objective of this particular group of competencies is to suggest that our experience and rationality are always limited and shape our understanding of the world from a human perspective.

Moving to the competencies of this specific Area, we have:

1) *Valuing sustainability:* this competence aims to foster reflections on values and perspectives concerning sustainability concerns. It is a meta-competence because it enables learners to challenge their way of thinking and acting, providing them with the tools to understand whether their behaviours cause any harm and are in line with sustainability values and thus contribute to sustainability.
2) *Supporting fairness:* this skill is about «promoting equity and justice among present and future generations while learning from traditions and actions» (European Commission, 2022). By explaining that equity and justice are profoundly connected to the quality of the environment, the chances to access green spaces
impact health and socio-economic issues. This, however, does not only mean that considering the environmental issues is a matter of human health, but that supporting fairness means also taking into account the wellbeing of other species and of the environment's biodiversity and ecosystems to preserve them and transmit them to future generations.
3) *Promoting nature:* this last competence of the first group refers to developing empathy towards the planet and respect for other species. To develop such skill, it is necessary to go through a deeper understanding of how the environment works, understanding all the relations and interdependences between living and non-living organisms. By promoting nature, we will be able to foster a healthy relationship with our planet and feel a connectedness to the experience of the environment and other species, especially when it is related to catastrophes and climate change. By nurturing this skill, the progressive process of alienation from nature, with consequences such as attention difficulties, physical and emotional illnesses, rising rates of myopia, increased obesity, and vitamin D deficiency, could be avoided by starting a meaningful relationship with nature.

GREENCOMP AREA 1	
Learning Outcomes	• Gain a comprehensive understanding of GreenComp as a reference framework for sustainability competencies. • Recognise the relevance of GreenComp in promoting sustainability and environmental consciousness. • Develop skills in the Area of Sustainability Values.
Group Size	20 participants + 1 trainer
Duration	2 hours
Materials	• PPT presentation • Whiteboard (+sheets) • Paper, posters • Markers
Preparation	• The Trainer shows the PPT presentation explaining what GreenComp is and deepening on the topic of GreenComp AREA 1 (15 min). • The Trainer divides the participants into 3 groups (1 per skill of AREA 1). • The Trainer encourages participants to design activities and to present them to others.

Description/Steps	1) Introduction to GreenComp and GreenComp Area 1 (15 min) The Trainer welcomes participants and explains what GreenComp is, particularly its importance in fostering sustainability competencies and its relevance in the context of sustainability and environmental consciousness. 2) The Trainer divides the participants into 3 groups (1 per competence of Area 1: o Valuing sustainability o Supporting fairness o Promoting Nature 3) The Trainer asks every group to formulate 1 NFE activity for primary and secondary school students that should be aimed at teaching the chosen value (a, b or c). Every group has 45 minutes to elaborate on the activity. 4) Every group has to present their activity design based on value a/b/c to the other groups (15 min x group = 45 min).
Learning Check/Evaluation	The floor is open for questions, comments, and a Q&A session with participants. The Trainer encourages participants to share their reflections on how they plan to apply the concepts learned in their personal or professional lives.

References	
	Bianchi, G., Pisiotis, U., & Cabrera Giraldez, M. (2022). GreenComp: The European sustainability competence framework. In Y. Punie & M. Bacigalupo (Eds.), EUR 30955 EN, Publications Office of the European Union, Luxembourg. ISBN 978-92-76-53201-9. [DOI: 10.2760/821058] Wals, A. E. J. (2009). Learning our way out of unsustainability: The role of environmental education. International Review of Education, 55(2-3), 131-148. Sterling, S. (2001). Sustainable education: Re-visioning learning and change. Schumacher Society Briefing, 6.

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TOPIC 5: GREENCOMP AREA 2 - EMBRACING COMPLEXITY IN SUSTAINABILITY AND RELATED COMPETENCIES

OVERVIEW

In this chapter, we will focus on the complexity of sustainability and its related competencies. As in the previous chapter, we will dedicate the first theoretical part, explaining the complexity of sustainability and describing the three competencies related to this field.

In the second part, you will find all the instructions to implement a workshop session with a group of participants interested in learning more on this topic through an NFE methodology.

AIM

- Provide educators and trainers with a tool for Training on the Complexity of Sustainability and related competencies.
- Delve into the GreenComp Area 2 by using NFE methodology.
- Guide the participants in understanding what GreenComp Area 2 is.
- Sustain the participants in developing system thinking, critical thinking and problem framing as sustainability-related skills.

EXPECTED OUTCOME

By the end of this workshop, participants should be able to:

- Grasp the intrinsic complexity of sustainability challenges.
- Apply systems thinking methodologies to address sustainability issues.
- Navigate ambiguity and unpredictability in sustainability contexts with confidence.
- Identify opportunities to nurture sustainability competencies in their students, equipping them to tackle complex global challenges effectively.

DURATION:

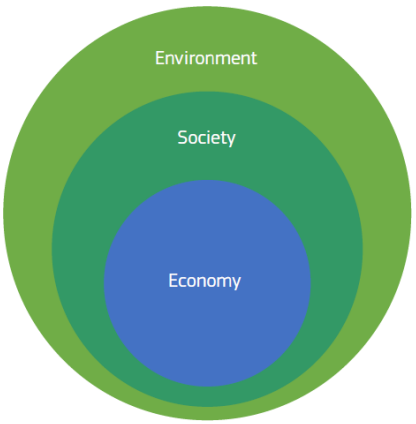
2 hours

GREENCOMP AREA 2

That of Complexity in Sustainability is a thematic exploration that delves into the intricate and multifaceted aspects of sustainability through the lens of the GreenComp framework. It recognises that sustainability challenges and the development of competencies for sustainable living are not isolated but deeply embedded in complex, interconnected systems.

More specifically, Area 2 of the framework delves into the urgency of developing skills that deal with understanding how processes such as technological change, digitisation, and globalisation have contributed to fostering our society's complexity and accelerating socio-ecological problems such as climate change and loss of biodiversity (Bianchi et al., 2022).

By embracing complexity in sustainability, this GreenComp area aims to encourage learners to adopt systemic and critical thinking patterns and identify interconnections between systems and framing challenges as sustainability problems. As the next picture shows, there is a strict connection between Environment, Society and Economy that cannot be discarded out of the problem frame.



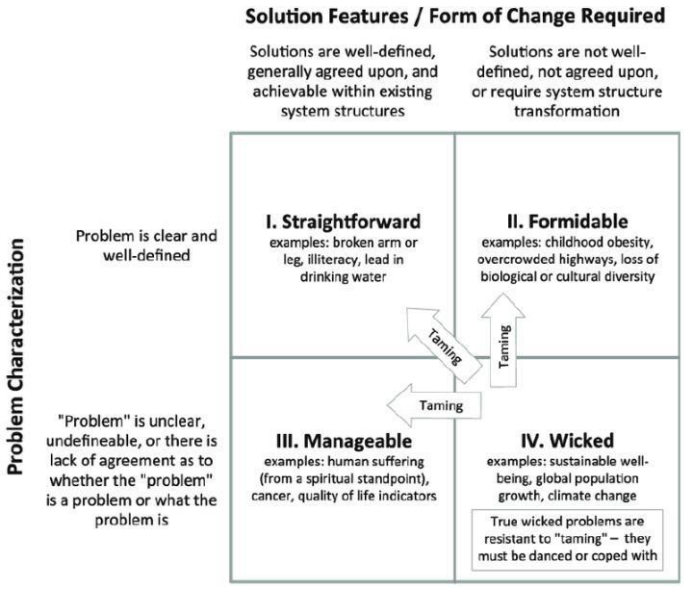
Interconnectedness of Economy, society and environment. (Source: Bianchi et Al., 2022)

«Learning for environmental sustainability enables learners to be better equipped to see connections and links between specific issues and environmental change» (Bianchi et al., 2022).

For example, health is a fundamental right that is strictly connected to the quality of the environment. However, families with lower incomes and minorities are often exposed to unhealthy environments, which affects both their wellbeing and actual physical health. Identifying this strict connection between social inequality and environmental issues can help to correctly frame the problems and think of just solutions that will impact all three levels.

In this regard, the skills related to GreenComp Area 2 are:

- **System Thinking:** the capability to approach a sustainability problem from all sides by considering its background (time, space and context) in order to understand how elements interact within and between systems. With this skill, we become aware of the interconnection between problem layers, and we identify feedback mechanisms. System thinking can be helpful as a tool to evaluate options, sustain decision-making and encourage taking action.
- **Critical thinking:** is defined by Bianchi et Al. as the competence through which we assess information and arguments and identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence our thinking process. To deal with complexity, not only system thinking is needed, but strict cooperation with a critical mindset to cope with complexity non-judgmentally. Critical thinking allows individuals to broaden their views and integrate perspectives in problem-framing.
- **Problem framing:** is the capability «to formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems» (Bianchi et. Al., 2022). Problem framing, in this regard, is the key to contextualising and defining a problem in sustainability given its context and works in strict synergy with system thinking and critical thinking to have a clear understanding of problem complexity.



Picture 2: Problem characterisation and change required. (Source: Bianchi et Al. 2022).

GREENCOMP AREA 2	
Learning Outcomes (Purpose of the exercise Explain why this exercise is implemented)	• The participants familiarise themselves with the GreenComp Area 2 meaning and skills • The participants develop their critical thinking, system thinking and problem-framing skills.
Group Size (Number of participants)	20 participants + 1 trainer
Duration	2 hours
Materials	• PPT • Whiteboard (+sheets) • Markers • Paper
Preparation	• The Trainer presents the PPT on GreenComp Area 2 • The Trainer stimulates the discussion and helps find 3 problems to be examined. • The Trainer divides the participants into 3 groups • The Trainer stimulates the final discussion to individuate the main difficulties. • The Trainer check the participants' learning process by asking them how GreenComp Area 2 can impact primary and secondary school teaching and students.

Description/Steps	
	1. The Trainer presents a PPT on GreenComp Area 2 (15 min). 2. The Trainer stimulates a discussion on some of the problems related to the linear economy model discussed in the previous workshops. The participants individuate 3 main problems (20 min) on which they will work in separate groups. 3. The Trainer divides the participants into 3 groups. Every group will deal with one problem and discuss (45 min): ○ **FRAME AT 360°:** how to approach the problem and its "solution" from all sides, considering time, space and context in order to understand how elements interact within and between systems. ○ **CRITICAL BACKGROUNDS**: assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions. ○ **INDIVIDUATE CHALLENGES:** 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.

	Useful material for both Trainer and participants can be found here: https://publications.jrc.ec.europa.eu/repository/handle/JRC128040. 4. Every group is invited to create an infographic with their work on a poster/paper using materials and to use internet resources to support their group research. 5. After the group work, the participants returned to a collective discussion and discussed the main difficulties related to the problem design. Also, they are required to individuate the skills they developed during the activity, considering the GreenComp Area 2 (20 min).
Learning Check/Evaluation	The group is encouraged to consider the importance of complexity, critical thinking and problem framing in sustainability, especially referring to younger generations (15 min).
References	Bianchi, G., Pisiotis, U. and Cabrera Giraldez, M., GreenComp The European sustainability competence framework, Punie, Y. and Bacigalupo, M. editor(s), EUR 30955 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-53201-9, doi:10.2760/821058, JRC128040.

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TOPIC 6: GREENCOMP AREA 3 - ENVISIONING SUSTAINABLE FUTURES

OVERVIEW

This session will focus on the GreenComp Area 3 – Envisioning Sustainable Futures and related competencies.

As you will have the chance to see from the following paragraphs, you will find an operative definition of this particular Area of the Sustainability framework. Moreover, as per the previous topics, you will find some instructions on implementing a workshop with a group of participants to develop their skills in the Green Comp Area 3.

AIMS

- Giving a background and operative definition of the GreenComp Area 3;
- Develop the GreenComp Area 3 skills, namely, future literacy, adaptability, and exploratory thinking.

EXPECTED OUTCOME

- The participants become aware of what GreenComp Area 3 is.
- The participants understand the importance and the meaning of GreenComp Area 3 skills.
- The participants are encouraged to adopt sustainable behaviours toward the future and can transfer their knowledge through NFE to other members of their communities.

DURATION:

2.5 hours

GREENCOMP AREA 3

The specific field of competence of GreenComp Area 3 - 'Envisioning sustainability futures' enables learners to visualise alternative future scenarios and identify actions to achieve a sustainable commitment toward the next generations.

Nowadays, learners must acquire the competence of adaptability while coping with uncertainty about the future and trade-offs in sustainability. Applying creative and transdisciplinary approaches to our thinking can foster a circular society and encourage learners to use their imagination when thinking about the future.

The three competencies designed as part of the GreenComp Area 3 are:

- **Futures literacy:** intended to envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred future scenario. This literacy empowers learners to create their visions for a sustainable future and provides them with the knowledge, skills and attitudes to understand the future as various alternatives.
- **Adaptability:** this skill is intended as the capability to manage transitions and challenges in complex situations, such as making decisions related to the future in the face of uncertainty, ambiguity and risk. Adaptability is about being flexible with regard to new situations and adjusting and accommodating changes in our complex world. This skill is about coping with uncertainty about the future and the ambiguity of wicked sustainability problems and how they may evolve.
- **Exploratory thinking** is explained as the ability to adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimenting with novel ideas or methods. Exploratory thinking aims to foster creativity in envisioning alternative futures. By tapping into different disciplines, traditions and cultures in a transdisciplinary manner, exploratory thinking can help learners create future visions for a circular economy and society. A combination of creative thinking and experimentation with new ideas and approaches is extremely needed to move away from linear production and consumption patterns to circular ones.

Learning about environmental sustainability encourages people to avoid looking for certainties and instead think about possibilities. Fundamentally, learners understand that the future is still open to change and can be shaped collectively. However, this requires the ability to analyse the present time and understand that it comprises complex systems interacting and influencing current and future trajectories, which are influenced by our values, worldviews and experiences.

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GREENCOMP AREA 3: ENVISIONING SUSTAINABLE FUTURES AND ITS COMPETENCES	
Learning Outcomes	• Understand the meaning of GreenComp Area 3 and its competencies • Develop the GreenComp Area 3 competencies
Group Size	20 people + 1 trainer
Duration	2,5 hours
Materials	• Copy of the Use Case 1 for every participant • Copy of Use Case 2 for every participant
Preparation	• The educator needs to be prepared for the theoretical part that they will present. • The educator needs to prepare a copy of Use Case 1 and Use Case 2 for every participant. • The session foresees group activities, games and discussions, so they need to stick to the target group and always focus on the needs to be targeted by its workshop.
Description/Steps	**1. GREENCOMP AREA 3 INTRO (15 min)** The Trainer presents a brief PPT on the GreenComp Area 3, especially on the related competencies. **2. FUTURES LITERACY (15 min)** Participants are asked to reflect on individually: A) **expected future,** i.e. what we expect to happen based on what it is happening today and what we know, e.g. business as usual; B) **alternative future(s),** i.e. what will happen may differ from expectations, e.g., the creation of green jobs that currently do not exist; C) **preferred future**, i.e. we may envision a sustainable future for us, our community and our planet, and identify the steps and actions needed to achieve that future, e.g. a circular economy.

	and write in post-its their ideas. After writing the 3 post-its they are encouraged to attach them in 3 dedicated posters. 3. **DEVELOP ADAPTABILITY (30 min)** Participants are encouraged to discuss their **fears** and **expectations** about future(s), especially on common answers. They are also asked to think about what they can actually do to face the unpredictable future(s). 4. **EXPLORATORY THINKING** (50 min) Participants are asked to name a discipline (the one they are best trained on) and are grouped according to similar backgrounds (3-5 groups). When in groups, they are encouraged to think about how their discipline can contribute to fostering sustainability in general and concerning the results of **ACTIVITY 1** (20 min). After the group activity, participants are asked to present what they have found to the other groups briefly, and the Trainer will ask the whole participants to imagine how different disciplines can work together in order to stress the necessity of a multi-disciplinary, creative and imaginative approach toward sustainability (30 min).
Learning Check/Evaluation	The group is asked to reflect on the pros and cons of thinking sustainability without discipline cooperation and to discuss the importance of future literacy (20 min).
References	Bianchi, G., Pisiotis, U. and Cabrera Giraldez, M., GreenComp The European sustainability competence framework, Punie, Y. and Bacigalupo, M. editor(s), EUR 30955 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-53201-9, doi:10.2760/821058, JRC128040.

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TOPIC 7: GREENCOMP AREA 4 – ACTING FOR SUSTAINABILITY

OVERVIEW

This session will deepen the background of GreenComp Area 4 – Acting Sustainability.

More specifically, in the first part, a background is available on this particular topic and on the related competencies. Moreover, on the practical side, this session offers a workshop to empower participants with the knowledge and skills to drive sustainability through political agency, collective action, and individual initiative.

AIMS

- Give a background on GreenComp Area 4 – Acting Sustainability.
- Cultivate a deeper understanding of how political agency, collective action, and individual initiative can contribute to sustainability.
- Equip participants with practical tools for effective engagement in sustainability-related issues.

EXPECTED OUTCOME

- Capability to frame the GreenComp Area 4.
- Comprehend the significance of political agency, collective aaction, and individual initiative in addressing sustainability challenges.
- Understand the interplay between policy-making, community involvement, and personal actions in achieving sustainability.
- Develop practical skills for advocating sustainable policies and practices at local, national, and global levels.
- Enhance communication and collaboration skills for effective collective action.
- Foster a sense of empowerment and agency to create positive sustainability outcomes.
- Value the interconnectedness of individual actions with broader sustainability efforts.

DURATION

2 hours

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EMPOWERING SUSTAINABILITY: FOSTERING POLITICAL AGENCY, COLLECTIVE ACTION, AND INDIVIDUAL INITIATIVE

Sustainability is not merely a buzzword; it's a necessity in our rapidly changing world. Climate change, resource depletion, and social inequalities threaten the very foundation of our planet. To address these global challenges effectively, we must empower individuals and communities to take action. This empowerment involves fostering political agency, encouraging collective action, and nurturing individual initiative, all essential components of a sustainable future.

Fostering Political Agency

Political agency refers to the ability of individuals and communities to engage in political processes, influence decision-making, and advocate for policies that promote sustainability. Empowering political agency is crucial because it ensures that the voices of those concerned about the environment and social justice are heard.

1. *Civic Engagement*: Encouraging civic engagement is a cornerstone of fostering political agency. This includes activities such as voting, participating in public hearings, and joining advocacy groups. Civic engagement empowers individuals to shape policies that align with sustainable principles.
2. *Environmental Advocacy*: Environmental advocacy plays a pivotal role in empowering sustainability. Individuals can leverage collective power to influence government policies, industrial practices, and public attitudes toward sustainability by supporting or creating organisations that advocate for environmental protection.
3. *Education*: Knowledge is power, and education is a powerful tool for fostering political agency. By providing individuals with information about environmental issues and their political implications, we equip them to engage meaningfully in sustainability discussions and decision-making processes.

Encouraging Collective Action

Collective action involves groups of individuals working together to address shared sustainability goals. It's a potent force for driving change at various levels, from local communities to the global stage.

1. *Grassroots Movements:* Grassroots movements are excellent examples of collective action. They often begin at the community level and grow as more people join the cause. Movements like Fridays for Future, started by Greta Thunberg, have mobilised millions worldwide to demand action on climate change.
2. *Collaboration* among organisations, businesses, and governments is essential for tackling complex sustainability challenges. Initiatives like the United Nations' Sustainable Development Goals (SDGs) exemplify how collective action can create a roadmap for a sustainable future.

3. *Technology:* Technology plays a pivotal role in enabling collective Action. Social media and digital platforms have amplified activists' voices and facilitated large-scale protests, awareness campaigns, and fundraisers for sustainability causes.

Nurturing Individual Initiative

Individuals are the building blocks of communities, and their actions collectively shape society. Nurturing individual initiatives means inspiring people to make sustainable choices in their daily lives and encouraging them to become sustainability champions.

1. *Sustainable Lifestyles*: encouraging sustainable lifestyles involves promoting conscious consumption, waste reduction, energy efficiency, and eco-friendly practices. Individuals can adopt habits such as reducing single-use plastics, conserving water, and opting for renewable energy sources.

2. *Entrepreneurship:* nurturing individual initiative also involves supporting green entrepreneurship. Sustainable startups and businesses prioritising environmental and social responsibility can drive innovation and create a more sustainable economy.

3. *Education and Awareness:* raising awareness about sustainability issues and their impact is vital. Programs that teach individuals about sustainable food choices, green transportation, and the importance of biodiversity can inspire change.

Empowerment Through Knowledge

Empowering sustainability ultimately rests on knowledge. Educating individuals about the consequences of their actions, the policies that affect them, and the opportunities they have to impact positively is a catalyst for change.

1. *Environmental Literacy*: environmental literacy programs in schools and communities can equip individuals with the knowledge and critical thinking skills to effectively address sustainability challenges.

2. *Access to Information*: ensuring that people have access to reliable information about sustainability, climate science, and environmental policies is fundamental. Transparency in government and corporate practices is crucial in this regard.

3. *Research and Innovation*: supporting research and innovation in sustainability can lead to breakthroughs that empower individuals and communities. It can also create economic opportunities and drive technological advancements that benefit the environment.

The Path Forward

Empowering sustainability is not a one-size-fits-all endeavour. It's a multifaceted approach that involves politics, collective action, and individual initiative. By fostering political agency, encouraging collective efforts, and nurturing individual commitment, we pave the way for a sustainable future. Every action, whether at the ballot box, in a community project, or in our

daily choices, matter. As we collectively work towards a more sustainable world, we empower ourselves and future generations to thrive on a healthier planet.

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GREENCOMP AREA 4	
Learning Outcomes (Purpose of the exercise Explain why this exercise is implemented.)	• Grasping Sustainability's Importance • Recognising Collective Action's Power • Understanding Individual Initiative • Embracing Political Agency • Utilising Educational and Informational Tools • Fostering Commitment to Sustainability
Group Size (Number of participants)	20 participants + 1 trainer
Duration	2 hours + 10 min evaluation
Materials (What is necessary for the trainer/facilitator and participants to carry out the exercise)	• Presentation materials (slides, handouts) • Facilitation guide • Timer or stopwatch • Whiteboard and markers • Laptop or computer for presentation (if applicable) • Evaluation forms or surveys (if desired)
Preparation	1. The Trainer reviews and prepares the presentation materials, including slides and handouts. 2. They familiarise themselves with the content and flow of the exercise. 3. Set up any necessary equipment, such as a laptop, projector, or whiteboard. 6. Arrange the seating and logistics of the training space for optimal engagement.
Description/Steps	**1. GETTING TO KNOW GREENCOMP AREA 4 (15 min)** The Trainer prepares a brief PPT explaining the meaning and the competencies related to the GreenComp Area 4. **2. ACTING SUSTAINABILITY IN MY COUNTRY (90 min)** The Trainer divides the participants into groups according to their nationality. Every group is asked to conduct a discussion (60 min) with their fellows in terms of: ○ **POLITICAL AGENCY:** navigate the political system and identify political responsibility and accountability for unsustainable behaviour and presence of effective/ineffective policies for sustainability (at the national level)

	○ **COLLECTIVE ACTION:** existing actions/organisations/commitments, formal and informal, for sustainability at the national level. ○ **INDIVIDUAL INITIATIVE:** identify possibilities of developing one's own (not at the institutional level nor at the collective one) potential for sustainability and actively contribute to improving prospects for the community and the planet at the national level. Every group is stimulated to use web sources and materials such as posters and papers to produce a summary/infographic to present the situation of their country to the other groups. Once ready, every group will present their summary (10 min x 3) + Q&A (10/15 min) to the others.
Learning Check/Evaluation	The Trainer stimulates the participants to discuss the importance of knowing the status of every country to produce effective actions at all political agency levels (10 min).
References	"The Role of Political Agency in Sustainability": - Article: "Citizen Participation and Political Agency: Exploring the Relationship in the Context of Natural Resource Management" by Christine E. Kray (Available on academic databases) "Collective Action and Sustainability": - Book: "Collective Action and Sustainability" by Elinor Ostrom (Available in libraries and online bookstores) - Research Paper: "Collective Action, Property Rights, and Decentralisation in Resource Use in India and Nepal" by Arun Agrawal (Available on academic databases) "Individual Initiative for Sustainable Living": - Website: [Sustainable Development Goals - Take action](https://sdgs.un.org/takeaction) - UN resources on individual actions for each Sustainable Development Goal (SDG). - Book: "The Good Life: Helen and Scott Nearing's Sixty Years of Self-Sufficient Living" by Helen Nearing and Scott Nearing (Available in libraries and online bookstores)

	"Community Engagement and Sustainability Projects": - Website: [Global Partnership for Sustainable Development Data](https://data4sdgs.org/) - Resources on data for sustainable development projects. - Research Report: "Community Engagement in Sustainability Initiatives: A Systematic Review" (Available on academic databases) "Global Sustainability Initiatives and Advocacy": - Website: [The Paris Agreement](https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement) - Information about the Paris Agreement and its significance in global sustainability. - Article: "Advocacy and Global Environmental Politics" by Charli Carpenter (Available on academic databases)

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TOPIC 8: CO-DESIGN WITH CHILDREN

OVERVIEW

In this session, the educator will introduce the participants to the topic of co-design to expand the set of methods and tools to be used as a methodology for dealing with sustainability with children.

The session will delve into both theoretical contents and practical activities, exploring the matter of co-design both theoretically and by suggesting a workshop to be implemented to upskill participants in co-design activities.

AIMS

- Provide the participants with a theoretical background in co-design.
- Inform the participants about the methods, techniques, and tools in the field of co-design for children and related to Non-Formal Education (NFE)
- Upskill the participants with co-design methodologies.

EXPECTED OUTCOME

- The participants will be able to understand what co-design is and distinguish it from other methodologies.
- The participants will develop their co-design skills.
- The participants will be able to implement a co-design workshop with children.
- Participants are encouraged to deepen the learning opportunities associated with Co-design.
- The participants are trained to develop better cooperation strategies between different people, organisations and disciplines.
- The participants show increased levels of support and enthusiasm for innovation and change.

DURATION

2 hours

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CO-DESIGN WITH CHILDREN

The term *co-design*—now in everyday use in both design and research contexts—derives from the work of Elizabeth Sanders and others on participatory design and co-creation. Sanders defines *co-design* as «collective creativity».

Co-design is about working with the people closest to the solutions, prioritising relationships, making sure people feel welcome, using creative tools, and building and sharing skills. Co-design uses inclusive facilitation that welcomes and works with many ways of knowing, being and doing.

As its name suggests, the co-design activity is the process of designing cooperatively and for a community. In this regard, co-design can be defined as an approach to *designing with*, not for, people. Also, it entails the use of participatory means and shared power by prioritising relationships and building collective capabilities.

Specifically, when co-designing with the youngster, many frameworks and techniques allow to work with children as partners during a design process.

Children are particularly suitable for co-designing sessions. In the proper context with the right tools, kids have no problem unleashing their wildest ideas and dreams to create previously unimagined product concepts.

However, conducting co-design sessions with children is challenging; a good amount of preparation and knowledge must go into such sessions. For this reason, we must first understand what co-designing with children means in a product development context and the theory behind this approach to design.

Many methods, techniques and tools can be used in NFE co-design with children; we will list a few below:

- **Collages**: you can get children to create collages to elicit discussion of intangible feelings and emotions. Children typically develop collages by choosing images from a large set of visual stimuli.
- **Cognitive and context mapping:** creates mind maps of abstract concepts, events, processes, routines, experiences, or systems. The materials used here are symbolic elements such as arrows, regular and irregular shapes, and some distinctive icons or words. These tools should help the children express the flow in a system or process, alluding to negative and positive aspects. Variations of this approach include doing context mapping as a game, using specific shapes or colours.
- **Storytelling (Storyboards)**: simple drawings, modelling, image cards, role-playing, fantasy games, and mixed-materials toolkits can help you to understand future experience journeys and ideal processes as stories. Storyboards describe a series of events or steps in a journey. They are an excellent collaborative tool to imagine future or ideal experiences from start to finish.

Some materials for storyboarding in co-design sessions include drawing supplies and storyboard templates that guide the participant without being prescriptive. Other materials include additional collections of icons, images, and symbols.

- **Low-tech prototyping and mockups**: you can use prototyping materials of any shape, colour, and size as stimuli for co-creation sessions with children.
- **Mixing ideas**: this approach aims to involve younger children—that is, children who are 6 to 8 years of age—in a design brainstorming process by encouraging each child to generate ideas and combine them with the ideas of others in a group. The final step of this process involves combining all the ideas a group has generated to create one big idea that provides a final, more structured direction for continued exploration as part of a design and development process.
- **Sticky-note frequency analysis**: each member of a group evaluates a product or prototype by writing what they like or dislike about using it on sticky notes, then placing the notes on a wall, where either the group—or an individual researcher—uses affinity diagramming to find patterns and trends.
- **Layered Evaluation:** use this method to generate ideas through the co-design. With this approach, participants develop an idea during the first sessions and continue building upon this initial work in successive research workshops.
- **Inspiration Cards**: by using inspiration cards, future scenarios and personas can be co-designed as stories. These cards can be made by the design and research team or purchased as a predefined deck. They contain a variety of images, words and/or complete sentences. The participants construct a story with the cards by positioning them on a large wall in the order they prefer.
  The cards can be divided by themes, such as people, places, vehicles, animals, etc., and should be big enough to be easily seen from an average distance when posted on a wall.
- **Games**: design, brainstorming, and innovation games can all be applied to co-designing in various ways.

When using co-design, teachers should always combine toolkits with other arts-and-crafts items such as coloured paper, foam, glue, scissors, stickers, markers, crayons, play-doh, or cardboard. Extracurricular activity sessions should last an hour in a room with plenty of space where children can move around and quickly access materials they can use freely to create things.

Duration:

2 hours

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WHAT IS CO-DESIGN and HOW TO IMPLEMENT IT	
Learning Outcomes	• Understand what co-design is • Upskilling in co-design as a methodology
Group Size	20 people + 1 trainer
Duration	2 hours
Materials	• Projector • PPT presentation • Video link • 6 Circular strategy cards - A5 print size • Worksheet - print in A3 or bigger • Markers or pens • Blank sheets
Preparation	• The educator needs to prepare a PPT presentation about Co-design • The Trainer needs to be prepared for the theoretical part that they will present through a PPT + video (linked above). • The session foresees group activities and discussions, so they need to stick to the target group and always focus on the needs to be targeted by its workshop. • The educator needs to prepare a PPT about the group activity “Circular strategy” to be presented and discussed among the participants. • - The Trainer needs to be prepared for the theoretical and practical parts that will present
Description/Steps	**WHAT IS CO-DESIGN AND HOW TO IMPLEMENT IT (15 min)** The Trainer will introduce the participants to the Co-design Strategies and Methods and all their examples through PPT. Moreover, the Trainer plays a video about the What is co-design: https://www.youtube.com/watch?v=54HTo63K4D4

	PHASE 1 (45 min) Participants are divided into 5 groups and asked to design a co-design session to be implemented with children of primary and second ary school. The sessions need to implement the NFE methodology, use the Tinkering Methodology and focus on sustainability topics. Participants can use the internet as support. **PHASE 2 (60 min)** Every group briefly presented their co-design session to the others. Participants are encouraged to give feedback to improve/further develop the sessions.
Learning Check/Evaluation	The Trainer asks the following questions to stimulate a group discussion (10 min): • Can you use co-design in your everyday work? • How can you use it? • What are the best methods that you can use regarding the students that you work with?
References	https://designforeurope.eu/what-co-design/ https://www.uxmatters.com/mt/archives/2012/04/co-designing-with-children.php https://uxmag.com/articles/creativity-based-research-the-process-of-co-designing-with-users https://www.circulardesignguide.com/resources#workshops

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TOPIC 9: STORYBOARD CREATION FOR CARTOONS ON SUSTAINABILITY

OVERVIEW

This workshop introduces participants to creating cartoons that integrate themes such as the importance of the circular economy, tinkering, and recycling.

This session explores how cartoons can be a creative medium to educate children in school on sustainability topics and encourage responsible behaviours in their everyday lives.

As per the other sessions, you will find a theoretical overview to understand better the topic and an example of the workshop to be implemented to create sustainability cartoons.

AIM

- To understand and integrate the themes of circular economy, tinkering, and recycling into storyboard creation for cartoons.
- To explore creative ways in which cartoons can teach these themes to children.
- To build up skills in visual storytelling, creativity, and education for sustainability.

EXPECTED OUTCOME

- Comprehend the fundamentals of storyboard creation and the integration of sustainability themes.
- Develop skills in creating engaging and educational storyboards focusing on sustainability themes for children.
- Enhance creativity and visual communication skills for educational purposes.
- Foster a sense of responsibility and commitment to promoting sustainability through creative mediums.
- Value the role of educational cartoons in shaping sustainable behaviors in children.

DURATION

- 2 hours

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STORYBOARD CREATION FOR CARTOONS ON SUSTAINABILITY

Comics have long held a unique place in the world of storytelling, captivating readers with their vivid visuals and compelling narratives. Beyond entertainment, they can educate, making complex topics accessible to a wide audience.

In recent years, a remarkable shift has occurred within the world of comics—a shift towards sustainability and the promotion of circular economy principles. These sustainable comics are not merely a trend but a powerful educational tool in conveying the importance of sustainability and circular thinking.

The Power of Visual Storytelling

Visual storytelling is a universal language, transcending age, culture, and language barriers. It engages readers on multiple levels, invoking emotions and sparking curiosity. Sustainable comics harness this power to educate and inspire action, addressing critical issues such as climate change, resource conservation, and sustainable living.

Circular Economy and Sustainability in Comics

The concept of Circular Economy has emerged as a central theme in sustainable development. Understanding and embracing circular Economy principles is crucial for future generations, and comics offer an excellent way to make these abstract concepts understandable.

In this regard, cartoons addressing Circular Economy can follow characters who learn the importance of recycling and reuse in everyday situations. These stories can be complemented by graphical representations illustrating how materials and resources can circulate within a closed-loop system instead of ending up in landfills or polluting the environment.

The Growing Significance of Cartoons in Education

Cartoons' role in education has grown significantly, particularly among younger audiences. Young generations are more visually oriented and accustomed to receiving information quickly and visually. In this environment, comics can provide educators with a powerful tool to engage students in learning and participation.

The Diversity of Comics

Comics and cartoons are not confined to traditional printed formats. Digital technology has opened new possibilities for creating interactive comics that allow readers to influence the storyline. This interactivity can make education more engaging and allow readers to explore various solutions to sustainability challenges.

Examples of Sustainable Cartoons

Around the world, numerous examples of sustainable comics have gained popularity and influenced broad audiences. One example is *The Water Princess*, a cartoon that addresses the importance of water conservation and access to clean water in sustainable development. This comic follows a young heroine who seeks ways to help her community conserve water and protect their water resources.

Another example is *Recycleman*, a comic that makes recycling a heroic act. The main character, Recycleman, embarks on global adventures, teaching the importance of recycling and demonstrating how everyone can contribute to environmental protection.

Future Outlook

Sustainable comics offer an inspiring way to tell stories and share knowledge about sustainable development. In the future, we expect to see more of these educational and impactful comics addressing circular economy, climate change, and other sustainability themes. Through these comics, we can educate future generations and inspire them to act for a sustainable tomorrow.

Conclusion

Cartoons are a powerful tool that can transform abstract concepts into vivid and engaging narratives. Sustainable comics have emerged as an educational method capable of reaching a wide audience and motivating people to act for sustainable development. In the future, we will undoubtedly witness more of these educational and influential comics that help shape a sustainable future.

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STORYBOARD CREATION	
Learning Outcomes	• Comprehensive understanding of the fundamentals of storyboard creation, including the integration of sustainability themes. • Gain insight into the significance of the circular economy, tinkering, and recycling in children's everyday lives. • Equip participants with practical skills to create engaging and educational storyboards centred on sustainability themes, • Participants enhance their creativity and visual communication skills, specifically focusing on using these skills for educational purposes.
Group Size	20 participants + 1 trainer
Duration	2 hours
Materials	• Drawing paper and sketchbooks • Pencils, erasers, and coloured markers • Flipchart and markers • Projector and screen for displaying examples • Laptop with internet access • Timer • Handouts on storyboard creation, circular economy, tinkering, and recycling
Preparation	• Organise drawing materials and handouts for participants. • Set up a projector and screen for showcasing examples. • Plan the timing for each activity to ensure smooth transitions and completion within 2 hours.
Description/Steps	**INTRODUCTION (15 mins):** The Trainer provides a brief overview of cartoons, emphasising the importance of storyboards and the integration of sustainability themes. Facilitate a discussion on the relevance of circular economy, tinkering, and recycling in children's daily lives.

	EDUCATIONAL CARTOONS (25 mins): Deliver a presentation highlighting the educational potential of cartoons, showcasing examples that focus on sustainability themes tailored for primary school children. Conduct a brainstorming session to encourage participants to explore how to effectively integrate circular economy, tinkering, and recycling into their storyboards. **STORYBOARD CREATION ACTIVITY (60 mins)** Participants embark on the creative process of conceptualising and crafting their own storyboards, ensuring the seamless incorporation of the discussed sustainability themes. Facilitators provide guidance and offer constructive feedback. Participants share their storyboards with the group, leading to discussions about the educational aspects represented. **REFLECTION AND DEBRIEF (10 mins)** Reflect collectively on the workshop experience and discuss the potential of cartoons as educational tools for sustainability. Encourage participants to contemplate further development of their storyboards and ideas beyond the workshop.
Learning Check/Evaluation	Summarise the workshop's key takeaways and learnings. Conclude with a quick feedback round to gather insights from participants (10 min).
References	McCloud, Scott. (1993). "Understanding Comics: The Invisible Art." Harper Perennial. This seminal work explores the art and language of comics, offering insights into the visual storytelling techniques that can be applied to creating sustainable cartoons. White, Lawrence C. (2019). "Animation from Pencils to Pixels: Classical Techniques for the Digital Animator." Routledge. This book provides a foundational understanding of animation techniques and principles that can be applied to creating sustainable-themed cartoons. References for Sustainable Cartoons: Online Resources.

	Storyboard That - Sustainability and Environmental Science. https://www.storyboardthat.com/articles/edu/sustainability-and-environmental-science An online platform that allows you to create storyboards and comics. It can be a valuable tool for crafting sustainable-themed cartoons with educational resources.

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TOPIC 10: EVALUATION

OVERVIEW

The training format provides several Evaluation and debriefing moments involving the educator and the trainees. Every day, after all specific activities, there will be an evaluation and debriefing aimed at taking stock of the situation and giving feedback to the Trainer responsible for the Training.

Beyond the daily debriefing/evaluation, a final evaluation session will be organised to discuss what was learned and collect general impressions on the whole training format.

AIMS

- Taking stock of the situation in terms of new competencies.
- Giving the educator and the group feedback on what can be improved in single sessions/workday.
- Provide space for debriefing and discussion with other participants.
- Get participants to self-assess their training journey.
- Collect general impressions and improvements on the Training.

EXPECTED OUTCOMES

Participants become aware of what they learned during the daily sessions, discuss improvements and their critical points with colleagues, and understand what they can and want to improve. Also, participants can evaluate their progress and compare themselves with the other teachers on the feasibility, transferability and reproducibility in their work context of what they have learnt daily.

Finally, participants provide feedback to the group and the Trainer on the structure and content of the Training in progress.

DURATION:

Daily debriefing: 20 minutes.

Final Evaluation: 1 hour

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EVALUATION

Evaluation and debriefing are a fundamental part of the learning process. Thanks to these moments, whoever is undergoing a training opportunity can become aware of what they have improved, of the critical points and observe from an outsider's perspective the results achieved and the work in progress.

Fundamentally, the evaluation and debriefing moments consist of two parts: one individual and one at the group level. In the first case, the participant autonomously reflects on his training journey and, by being solicited by the educator, interrogates themselves on daily achievements, critical points and interests related to the contents of the activity.

However, the second moment regards the collective dimension of Evaluation. After having reasoned on his own journey, every participant discusses with the other teammates the contents of the training format, its transferability, and reproducibility in the school context, trying to understand together the challenges they could face while applying what they have learned.

Fundamentally, Evaluation and debriefing happen daily to put participants in a position to reason about their learning dynamics and push them to think while learning about the possible problems they might encounter and the feasibility at a practical level of what they are learning.

The role of the educator in this phase is crucial. They must be able not only to mediate the discussion among the participants but also to ask the right questions that can stimulate the participants' critical thinking about the path they are facing.

Debriefing then allows us to go back and see what has been missed, the critical points and those already in place. It allows the incorporation of of new perspectives and suggestions for developing new briefs, further stimulating the group's creative force.

Regarding the debriefing phase, some key points that the educator and the participants need to go through are:

- Summarise the main learned points.
- A reminder of the project scope, insights and deliverables in order to be clear about what should be achieved.
- Report of actions to be carried out at the stakeholder level, analysis and implementations that can be carried out.
- Evaluation to see where singular participants and the group got to.

In general, debriefing and evaluation moments improve the team performance and promote a positive change in behaviours.

Moreover, the use of creativity in a debriefing can be extremely helpful and engaging for the participants. Also, this allows the concepts of the day to be better elaborated. Therefore, participants can be asked to represent with a metaphor what happened during the day.

to imagine through a collage, a drawing, a story what the group's work will be in the light of the strengths and weaknesses that emerged during the day.

The educator can even use some digital and creative tools, such as editable digital whiteboards accessible from smartphones, in order to collect feedback and engage the participants.

Some of the questions the educator can ask could be:

- What is your impression of today's experience?
- Did it meet your expectations? What went well, and what went wrong?
- What did you do well; what did you find difficult and why?
- Were the day's objective and the rules for carrying out the activity clear to you right from the start?
- What did you learn during this experience?
- Can you apply what you learned today in your daily work? If so, how?

EVALUATION	
Learning Outcomes (Purpose of the exercise Explain why this exercise is implemented.)	• Manage the different notions learnt. • Understand and distinguish the objectives of the different modules. • Understand together with their peers what expectations they had of the learning. Modules, what was expected and whether some were not met. • Understand how to apply notions learnt during working hours with children.
Group Size (Number of participants)	20 participants + 1 trainer
Duration	30 min
Materials (What is necessary for the trainer/facilitator and participants to carry out the exercise)	• Post-it • PPT presentation • Projector • Pens
Preparation	The educator will stimulate the participants to reflect on their work during the workshop and engage them in a discussion.
Description/Steps	**Daily Evaluation (20 min)** 1) The educator projects the questions to be shared with the participants: • What were your expectations regarding what went well and what went wrong? • What did you do well; what did you find difficult and why? • Can you apply what you learned today in your daily work? If so, how? • Did you like the class environment? How did you find your peers? • Do you have any advice for the Trainer for the next few days? • Random suggestions or comments on how to implement the following sessions.

	The educator asks everybody to answer individually on an anonymous Post-it. Participants can also concentrate on 1/2 questions if they think these are more relevant for that day, or the Trainer can decide to focus on 1 or 2 questions because they think they are more appropriate that day (eg. 1st day: asking about training method and implementation). After writing their answers on the post-it, the participants attach them to a billboard/poster divided into EXPECTATIONS, DIFFICULTIES&PROUD MOMENTS; ENVIRONMENT AND TEAM PLAY; FEEDBACKS, REPLICABILITY. 3) The educator stimulates the participants to discuss with their peers, who are asked to speak out their impressions on the training day (10 min). **Final Evaluation (60 min)** 1) The participants are asked to answer the final evaluation questionnaire (30 min) 2) The participants are asked to access the online board and answer, in a group discussion, the following questions: • What is your impression of this experience? • What were your expectations about the whole experience? • What did you do well; what did you find difficult and why? • What did you learn during this experience? • Will you be able to apply what you learned today in your daily work? If so, how? • What parts did you like the most, and will you use for your lessons? • Will you suggest this Training to your peers? Are there parts you would improve? (30 min).

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CONCLUSIONS

In the various chapters of this handbook, the topic of the Circular Economy, Tinkering Methodology, GreenComp framework and sustainable thinking toward an eco-responsible citizenship development in younger generations has been approached from different pedagogical perspectives.

Specifically, we have analysed what the situation is at national and European level (Italy, Republic of North Macedonia, and Finland) in the teaching of the Circular Economy and Tinkering Methodology. We stepped out into the field and confronted with stakeholders to understand what the needs of the categories concerned were, in order not only to grasp shortcomings and needs, but above all to fill that gap with the support of material aimed above all at teachers, but also at anyone who is going to experiment with teaching these topics to children (or, why not, adapting it, even to adults).

With respect to these needs, the handbook provides a brief overview of the Tinkering Methodology, an innovative and very effective tool, which despite having great potential, especially with the younger generation, is still not widely disseminated. As we understood, Tinkering is an innovative approach to learning increasingly adopted within informal learning settings to engage people with STEM learning. It is a highly personal and learner-cantered approach which meets the learner at their own level and pace and enables to use existing skills, as well as to test and try out new ones. Tinkering encourages learning through mistakes and failures and in turn helps to develop skills, such as such as critical thinking, creativity, problem solving, communication, self-confidence, and digital literacy.

Finally, we have provided a Training Format that teachers can use, replicate or adapt to their own needs by providing not only theoretical material to use for their classes, but also guidelines for implementing practical workshops according to the Non-formal Education methodology.

To this regard, the ECO-FUTURE Manual have foreseen the production of a comprehensive format based on a pedagogical learning process made by joining efficient and practical methodologies with the aim of transferring to teachers and pupils competences and knowledge on CE Education, Tinkering Methodology and GreenComp as a key for developing a sustainability mindset.

We think that with the support of this manual, teachers can be guided by a helpful and handy comprehensive tool for promoting interaction, creative expression and active citizenship among young students from an early age together with supporting the development of an increasingly necessary green awareness.

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ANNEXES

Havukovski School

Havukoski School has been a multicultural school from the beginning, since 1987. Havukovski School actions included: International exchanges; Participation in a few Polish-German meetings and cooperation with Polish-German Collaboration Office “Jugendwerk”; Cooperation with German and Canadian embassy, French Institute and Goethe Institute; Trips abroad to Germany, France, Lithuania, cruises on the Mediterranean Sea; Organization of “Days of the English Language”.

Mine Vaganti NGO

Mine Vaganti NGO is a non-profit organisation established in Sardinia, Italy in 2009, whose services encompass Education and Training, Project Design and Development, Thematic Research, International Mobility, and Consultancy – in Youth, Adults, Education and Sports sectors. MVNGO has 3 offices in Sassari, Olbia and Tempio Pausania, impacting the North of Sardinia and reaching out with its operational branches to many other regions in Italy, around Europe and beyond.

ASDA

ASDA is a non-governmental, non-profit organisation concerned with civil society issues, mainly promoting equal opportunities and good relations between persons of different racial groups. The organisation was established in 1995 but registered in 2000 in Helsinki, Finland. The organisation’s mission is to provide guidance, health, social, educational, vocational and character development of youth through structured activities such as short and long courses, homework support, field trips, sports, trainings, seminars, and cooperation development with underdeveloped countries.

Osnovno Uchilishte So Resursen Centar “Maca Gjorgjieva Ovcharova”

The school offers nine-year primary education for students with disabilities. In 2021, the school was transformed into a primary school with a resource center according to the changes in the law on primary education. The school provides education to students with disabilities in three department with unique methods, providing educational assistants, treatment and rehabilitation.

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