



Funded by
the European Union

FITDigit

2022-1-FR01-KA220-EDU-000034740]

A Green Future in the Digital World - *FitDIGIT*

[2022-1-FR01-KA220-EDU-000034740]



Erasmus+

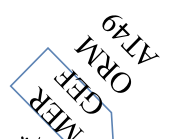
FITDigit



Funded by
the European Union

*Environmental sustainability - Handbook and e-coding curriculum and
exercises for students*

**Istituto Comprensivo Borgetto-Partinico
Secondary School
Borgetto – Italy**



Introduction

This handbook aims to make students more aware of the issues of environmental sustainability and circular economy through a stimulating approach that uses methodologies and tools close to their interests, such as the world of video games, social media and digital.

A pedagogical approach is used for this handbook that, starting from emotional involvement, arrives at practical hands on activities, passing through four different stages:

Emotional involvement: watching images or films, listening to songs, reading stories or specialized texts with a strong impact, or playing a game with the aim of capturing the attention and the minds and hearts of the students;

Personal considerations: stimulation and collection of impressions, feelings, opinions, questions, objections. That is, children need to move beyond mere emotional impact to begin to reason about what they have seen/read/heard. To think, form an opinion, investigate, ask questions.

Information gathering and analysis: the personal reflections and questions that have emerged must at this point become a stimulus for deepening, analyzing, researching information (in our case the two different economic models and related examples).

Final practical activity/project: the teacher has the task of accompanying the students in exploring the problems that afflict the world, but must then also offer guidance, showing direction and support. For each problem, a possible solution will be sought. Therefore, the path will culminate in something tangible, even and especially at the digital level.

The handbook contains two sections the first considering the theoretical treatment of the relevant issues and the second outlining the practical activity to be carried out in the classroom with students.

It consists of seven educational modules that each address a specific topic related to environmental sustainability and the circular economy:

Module 1 - Environmental education and sustainability challenges

Module 2 - The linear and circular economy compared

Module 3 - The Rs of the circular economy

Module 4 - The impact of the circular economy on the environment

Module 5 - "Greenwashing": a false friend of the circular economy

Module 6 - Circular is possible: stories of the circular economy

Module 7 - Creations of e-coding exercises.

FIRST SECTION

MODULE 1

ENVIRONMENTAL EDUCATION AND SUSTAINABILITY CHALLENGES



To talk about the environment, its protection and preservation is to talk about the very survival of our planet and the human species that inhabits it.

For the first time in human history, man's life and activities on earth can determine his\her future. Never as in recent years, at a rate that is growing exponentially, do we realize, to our cost, that the damage caused by man to his natural habitat is assuming the character of emergency and drama.

The numerous memorandums of understanding that Heads of State periodically sign seem to have no significant effect at the moment; disconcerting, then, is the bitter realization that there are those who even go so far as to put safeguarding the economy and development ahead of preventing the serious climate changes that they inevitably produce and that are the primary cause of environmental disasters. For too many years this vision has always been set aside or - even worse - completely ignored, in favor of economic policies that put development and progress "at any cost", first. The results are what we see today, and which will lead us, without a decisive intervention, to an escalation that will jeopardize the entire destiny of humankind. If all this sounds beyond alarmist, just think of the speed at which the earth's average temperature is increasing and the melting of glaciers, which will lead according to some hypotheses by the end of the 21st century, to the rising of the sea level with the consequent disappearance of many coastal areas, today intensely populated. The looming scenario is thus far more than alarming;

if the millions of people living in those areas today were to be forced to migrate to the continents' interior, it could give rise to human conflicts over the protection and preservation of their living space. Not only that, all economic sectors linked today to the exploitation of the seas and coasts would be in danger of becoming completely extinct, with obvious consequences in terms of economic and social development. In the face of all this, each of us has a duty to adopt new lifestyles and habits; it is necessary that even the action of the individual for the defense of the environment becomes a fundamental building block toward the construction of a future that no



longer endangers the survival of the planet. In this regard, there is no doubt the need to pay close attention to the environmental issues of planet Earth, such as pollution, biodiversity, climate change, waste management, and food waste.

All this is done to inculcate in the new generations the awareness that the planet's resources are limited, to arrive at a vision in which man does not seek to indiscriminately exploit the environment, but rather learns to respect nature and preserve the wealth it gives us on a daily basis; to educate human beings to manage their behaviors in relation to the ecosystem, without altering the balance of nature but, at the same time, succeeding in meeting the needs of the community.

To learn more

<https://venti-trenta.it/agenda-2030>

<https://www.youtube.com/watch?v=dn-hLQk49eA>

These issues will be discussed below briefly. For in-depth discussions click on the links.

Air pollution is a form of pollution, that is, the combination of all physical, chemical, and biological agents that change the natural characteristics of the Earth's atmosphere. The effects on human health due to poor air quality mainly involve the respiratory and cardiovascular systems. Air pollution causes millions of deaths each year worldwide and is among the greatest environmental health hazards.

The main effects of air pollution are the greenhouse effect and acid rain, the ozone hole, and other impacts on flora and fauna. Air pollution impacts humans, ecosystems, buildings, materials and climate.

To learn more

<https://education.nationalgeographic.org/resource/air-pollution/>

<https://www.eea.europa.eu/en/topics/in-depth/air-pollution>

<https://climatekids.nasa.gov/air-pollution/>

<https://openoregon.pressbooks.pub/envirobiology/chapter/10-1-atmospheric-pollution/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7044178/>

Soil pollution indicates the alteration of the chemical, physical and biological balance of soil, as well as the susceptibility to erosion, landslides and the entry of harmful substances even into the human food chain. It is due to the dumping of industrial wastes (heavy metals: arsenic, copper, cobalt, etc.), illicit burial of solid wastes (plastic, glass, paper, medicine), gaseous wastes such as canister wastes.

To learn more

<https://atlas-scientific.com/blog/soil-pollution/>

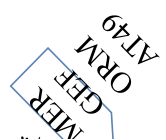
<https://www.youtube.com/watch?v=wHcY-iFSYZM>

https://www.youtube.com/watch?v=8_69vy7ZBxE

<https://www.youtube.com/watch?v=PhGuP10YABA>

Water pollution is of several types:

- civil: comes from city discharges when water flows without any purification treatment into rivers or directly into the sea;





- industrial: formed by different substances that depend on industrial production;
- agricultural: related to the excessive and incorrect use of fertilizers and pesticides that penetrate the soil and contaminate groundwater.

Some chemicals in water are particularly dangerous to human health and the survival of many living species, such as certain metals (chromium, mercury) or compounds such as chlorinated solvents.

To learn more

<https://education.nationalgeographic.org/resource/what-water-pollution/>

<https://www.eea.europa.eu/publications/zero-pollution/health/water-pollution>

<https://www.youtube.com/watch?v=Om42Lppkd9w>

<https://www.water-pollution.org.uk/>

Climate change also has disastrous consequences on our planet; we see this in the increasingly frequent natural disasters such as floods, storms, droughts, and extreme heat waves that significantly affect the land, causing damage to public, private, productive and agricultural assets. These disasters destroy homes and livelihoods and are a major cause of increased hunger and poverty in the world.

To learn more

<https://www.un.org/en/climatechange/what-is-climate-change>

<https://climate.nasa.gov/>

<https://www.un.org/en/climatechange/science/causes-effects-climate-change>

<https://youtu.be/JgvDuLcL4yQ>

Biodiversity - the variety of animal and plant species on the planet is disappearing at an alarming rate in recent years, mainly due to human activities such as changes in land use, various forms of pollution, and climate change.

Biodiversity encompasses all forms of life on earth, their genetic variations and their interaction within complex ecosystems. In a U.N. report released in 2019, scientists issued extinction warnings for one million species, many of which are at risk of disappearing within a few decades. In short, biodiversity ensures us a wider variety of species, a wide variety of crops, the natural sustainability of all life forms, a healthy ecosystem, and it is a source of goods, resources and services for humans, helps us combat climate change and reduces the impact of natural hazards.

To learn more

<https://education.nationalgeographic.org/resource/biodiversity/>

<https://www.amnh.org/research/center-for-biodiversity-conservation/what-is-biodiversity>

https://www.youtube.com/watch?v=GK_vRtHJZu4

<https://www.youtube.com/watch?v=XTC4qiXd36Q>

Proper waste management is also fundamental to environmental protection.

Waste management concerns the set of policies, procedures or methodologies aimed at managing the entire waste process, from its generation to its final destination thus involving the phase of collection, transportation and disposal up to the reuse of waste materials, usually produced by human activities, in an attempt to reduce their effects on human health and impact on the natural





environment. A particular interest in recent decades has been in reducing the effects of waste on nature and the environment through the possibility of recovering natural resources from it and reducing the production of waste itself through optimizing its management cycle (?).

To learn more

<https://safetyculture.com/topics/waste-management-system/>

<https://youtu.be/42UHIRVwxec>

<https://www.youtube.com/watch?v=Fex-wvrOzf4>

Food waste also generates very significant environmental and socio-economic effects, as natural resources are unnecessarily used and greenhouse gas emissions are generated to produce food that will never be consumed. Food waste has a number of implications that go on to affect other fields. In fact, it has ethical and economic as well as ecological implications; it is a major contributor to global pollution and is responsible for tons of greenhouse gases emitted into the atmosphere; in addition to the waste of food that is still edible, the resources to produce it (energy, water, land, fuels, labor) are also wasted; and on an economic level, about a trillion dollars in social, health and environmental costs caused by food waste must be put on the bill. The FAO estimates that around 1.4 million hectares of arable land in the world are used to produce food that will never be eaten, and that this has a major impact on the loss of valuable biodiversity.

To learn more

<https://foodprint.org/issues/the-problem-of-food-waste/>

<https://www.unep.org/news-and-stories/story/why-global-fight-tackle-food-waste-has-only-just-begun>

<https://umaine.edu/sustainability/2021/04/25/food-waste/>

https://youtu.be/4X_n8VAjxSU

<https://www.pbslearningmedia.org/resource/ee18-sci-greentm/kids-go-green-waste-less/>

For several years now, Heads of State have been coming together to discuss the problems related to recent climate change and to propose possible and sustainable solutions, which is why they have signed International Agreements on Climate Action. The common will is to reduce the greenhouse effect, which causes the planet's average temperature to rise, with obvious and tragic consequences that follow.

In view of all that is happening, and foreshadowing an inevitable and irreversible damage to the environment, schools also have a duty, towards the future generations to whom the planet will be handed over, to implement all possible measures and strategies to raise awareness among the citizens of tomorrow. Today, this topic is part of the teaching of Civic Education, which includes, as mentioned, environmental education. There is an old Indian saying "educate a child and you will educate a tribe."

The purpose of this saying was not environmental protection, but the underlying concept that fascinates us and that we believe is useful in explaining the importance of investing in young children through good example and education toward environmental issues.



Being able to transfer and disseminate in daily practice, both school and extracurricular, what emerges from the above reflections is probably one of the challenges that environmental education must prepare to face in the near future.

Anyone who cares about the future of the Earth cannot but be concerned about declining biodiversity, habitat loss, mass extinctions, climate crisis and other highly critical situations triggered by humans. Unfortunately, what has been done to our planet cannot be undone. The only way to preserve what is left of environmental resources and ensure survival for future generations is to take real action, to overcome policy inaction and turn disquiet into energy for change. Environmental and sustainability education is now more important than ever for multiple reasons.

It explains how human actions can affect the ecosystem in which we live; it helps us understand the interdependence between the environment and society; it promotes the conservation of nature, natural resources and biodiversity, and the reduction of the environmental impact of human activities; it helps promote sustainable lifestyles and reduce waste; and it encourages active citizen participation in the protection of environmental heritage and behavior that respects nature and the environment.

Environmental education, therefore, is a key tool for raising awareness among citizens and communities to greater responsibility and attention to environmental issues and good land governance. This is a complex and stimulating challenge to which the entire Education and Training System is called to respond. Indeed, schools have the task of educating students to inhabit the world in new and sustainable ways and to make them protagonists of change.

Current changes differ from past changes in terms of their causes and drivers, as well as their unprecedented pace and scope. Extreme events such as storms, heat waves, floods and droughts, which used to occur once every hundred years, have become our new reality. Headlines around the world allude to a climate and environmental crisis such that it will affect the future of our species. The global climate is changing by man!

World economies depend on fossil fuels, land use practices, and global deforestation are increasing concentrations of greenhouse gases in the atmosphere, which, in turn, are driving global climate change. It also becomes clear that climate change is affecting everyone and every corner of the planet, including Europe, and impacting people, nature, and quality of life.

Science strongly argues that life on earth is experiencing a loss of diversity at an unsustainable rate. Every year, many species go extinct due to the continued pollution and destruction of their habitats. The widespread use of pesticides has led to a drastic reduction in some species, such as bees and butterflies, pollinators that are vital to our well-being.

Pollutants produced by economic activities accumulate in the environment, reducing the ability of ecosystems to regenerate and provide us with vital services. Environmental degradation affects not only plants and animals, but also people.

The twenty-first century has also been marked by **economic and financial crisis**. Numerous research studies confirm that our consumption and production systems are simply unsustainable.

The linear economic model, which transforms raw materials into products that are used, consumed and then discarded, not only results in increased pollution and waste production, but also in global competition for natural resources.

What is more, it is clear that the benefits of economic growth are not shared equally globally. Income levels vary widely across countries, regions and cities.

Even in Europe, where living standards far exceed the world average, there are communities and groups of people living on incomes below the poverty line.

Unfortunately, some of these communities and people are also more vulnerable to environmental risks. For them, they are more likely to live in areas that are more exposed to air pollution and flooding, as well as to live in homes with insufficient insulation to protect them from extreme temperatures. The communities that enjoy the benefits are not necessarily the ones that bear the costs.

If current trends continue, regardless of country or income level, future generations will face a situation characterized by more extreme temperatures and weather events, reduced biodiversity, greater scarcity of resources, and higher levels of pollution. With this in mind, it is not surprising that thousands of young Europeans are demonstrating in the streets, urging policymakers to take more ambitious and effective steps to mitigate climate change.

Over the past forty years, Europe has implemented policies to address specific problems, such as air and water pollution, sometimes achieving remarkable results: European citizens benefit from cleaner air and bathing water; more municipal waste is recycled; the number of protected land and marine areas shows a continuous increase; greenhouse gas emission levels in the European Union are reduced compared to 1990 levels; billions of euros have been invested in more livable cities and sustainable mobility; energy generated from renewable sources has increased exponentially, etc.

Now our knowledge and understanding of the environment has also expanded, emphasizing the fact that people, the environment and the economy all form part of the same system. Since its establishment twenty-five years ago, the European Environment Agency has been trying to correlate and develop these areas of knowledge in order to improve our systemic understanding. People cannot live well if the environment and the economy are in bad shape. Social tensions will continue to be fueled by inequality in the distribution of benefits, such as economic wealth and cleaner air, and costs, which include pollution and a loss of yield due to drought.

These are hard facts to accept. At the same time, it can be difficult to change consumer habits and preferences as well as well-established governance structures. Yet, despite the magnitude of the task ahead, it is still possible to build a sustainable future. This implies disrupting current practices such as, for example, cutting environmentally harmful subsidies, phasing out and banning polluting technologies, while fostering sustainable alternatives and supporting communities affected by change. A zero-carbon circular economy can reduce the impact on our natural capital while also limiting the rise in global temperatures.

Changing course will also force us to change our habits and behaviors, such as our travel patterns and eating habits.



Funded by
the European Union

FITDigit

2022-1-FR01-KA220-EDU-000034740]

The knowledge needed to guide the shift toward long-term sustainability exists. In addition, growing public support can be counted on to bring about the change that now requires accountability and accelerated procedures on our part.

To learn more

<https://www.youtube.com/watch?v=3sy0ZzyNNug>

https://www.youtube.com/watch?v=-D_Np-3dVBQ

<https://www.youtube.com/watch?v=9yPnfDVd6Fc&t=3s>

<https://www.youtube.com/watch?v=0zocYDPBiWU&t=11s>

MER
GEE
ORM
AT49

MODULE 2 LINEAR AND CIRCULAR ECONOMY



Today, our development system is based on the so-called Linear Economy, which uses natural resources (mainly fossil fuels) to generate goods and services, closing its production process with the elimination of waste, which is bound to accumulate more and more.

On the other hand, the Circular Economy aims to reduce most waste by converting it into an available and reusable resource, called second raw material, within the production process. Every product, from the moment it is manufactured to the moment it is actually used, is optimized until the end of its life cycle.

In this way, it is possible to recover and reuse all (or almost all) waste material as a starting point for another production chain.

In fact, the Circular Economy aims to eliminate waste through better structure and more efficient design of materials, products, systems and even business models, adding value and quality to the production process, consequently succeeding in generating a more environmentally sustainable development system.

The Circular Economy is an alternative to the traditional linear economy of "**take, make, throw away**" in which we exploit resources for as long as possible, extract maximum value from them while they are being used, and then discard and regenerate products and materials at the end of their lives.

The concept of the circular economy has deep roots, but it cannot be traced back to a single father or a specific date of birth. Conventionally, it is traced back to the late 1970s, when academics and businessmen began discussing the topic.

Giving impetus and popularization in Europe to the circular economy was British yachtswoman Ellen MacArthur.

After breaking the world record for solo circumnavigation of the globe in 2005, she interrupted her career at the age of 33 to devote herself full-time to fighting for the environment. In 2010 she started the **Ellen MacArthur Foundation**, a nonprofit working with companies and educational institutions to accelerate the transition to a circular economy.

On December 2, 2015, the European Commission adopted an ambitious package to help accelerate Europe's transition to a circular economy, boost global competitiveness, promote sustainable economic growth, and create new jobs.

The action plan defines 54 measures to "close the loop" in the life cycle of products: from production and consumption to waste management and the secondary raw materials market. It also identifies five priority areas to accelerate the transition along their value chain (plastics, food waste, essential raw materials, construction and demolition, biomass and biological materials).

The plan places a strong emphasis on creating a solid foundation on which investment and innovation can flourish. The transition is financially supported by the European Structural and Investment Funds, Horizon 2020, the European Fund for Strategic Investments (EIFS) and the LIFE program. All 54 actions under the plan have been implemented or are in the process of implementation. The regulations aim to have a practical and concrete effect on the lives of European citizens. For example, the measure obliges member countries to recycle at least 70 percent of municipal waste and 80% of packaging waste, and prohibits landfilling biodegradable and recyclable waste. Based on the premise that climate change and environmental degradation are a huge threat to Europe and the world, on December 11, 2019, the European Commission presented its communication on the European Green Deal.

It is a new growth strategy aimed at "transforming the EU into a climate-neutral, just and prosperous society with a modern, resource-efficient and competitive economy." EU leaders reaffirmed their commitment to play a leading role in the global fight against climate change at the December 2019 European Council meeting, where they endorsed the goal of climate neutrality by 2050.

To overcome these challenges, Europe has set three goals:

- ✓ no more net greenhouse gas emissions are generated in 2050.
- ✓ economic growth be decoupled from resource use
- ✓ no person or place is neglected.

To learn more

<https://www.thegoodintown.it/storia-di-ellen-una-velista-nelleconomia-circolare/>

The idea of the cycle, a traced circle that returns to the starting position, well defines the main idea. The protagonist of this story is the product, which begins its "circle," or better, its lifecycle with the product design and continues with the production, distribution, consumption, reuse, collection, and, finally finishes off with the recycling phase. The circle restarts with an initial form and gives birth to a new product. In a world where resources are bound to become extinct, this may be the main solution to solve the problem of scarcity in the economy. More importantly, it is the solution to making our presence on Earth truly sustainable, protecting the species we coexist

with and humankind. The circular economy is for all intents and purposes a model of production and consumption that focuses on terms such as repair, reuse but also borrowing and sharing. Just as a wheel can turn indefinitely, if animated by something (be it an engine or the driving force of a changing society), the product cycle can also keep turning until the good is brought back into the economic system. This produces additional value, relative to the initial value, both in the market and in society. One of the most popular words for years in the field of environmental sustainability is undoubtedly the word recycling. But what is the difference between classic recycling and the circular economy?

Recycling may be one stage, the final stage of the circular economy. But the difference between the two is not only philosophical but also practical and relates to the temporal phase in which the two factors intervene. If recycling, in fact, takes place at the end of the product's life cycle, when it has now become waste for all intents and purposes, the circular economy is a process that starts from the beginning, we might say from the "conception" of the product, so that it can be thought of as an asset to be repaired, rebuilt and then reused.



To learn more

<https://www.youtube.com/watch?v=zCRKvDyyHmI&t=4s>

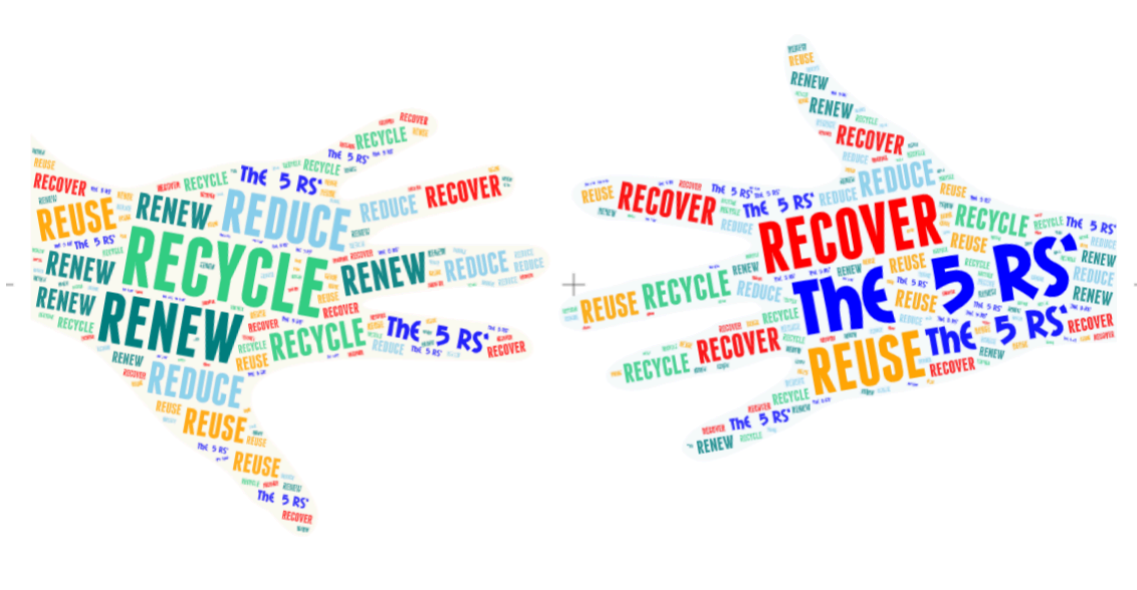
<https://www.youtube.com/watch?v=euv-eteg1SM>

<https://www.youtube.com/watch?v=Qtx8cUv--NQ>



MODULE 3

THE Rs OF SUSTAINABILITY



It is estimated that each of us produce about one and a half pounds of waste every day. With a quick estimate, we realize that mountains of waste come out of our homes that threaten to suffocate our environment if we fail to dispose of it properly.

THE RULE OF THE 5 Rs is fundamental to understanding the importance of living with zero waste. The rule is based on 5 actions: Reduce, Reuse, Recycle, collect and Repair and Recover. These actions should be a mantra in our homes, offices, classrooms ... and be the focus of our daily lives and policies geared toward environmental sustainability.

REDUCE = using fewer resources. Consists of the concrete reduction of the origin of waste through the adoption of appropriate behavioral lines to follow. At the individual citizen level, it is important to choose products with reduced and/or reusable packaging when purchasing. Small steps that on a large scale carry a lot of weight.

REUSE = recover and reuse products when they have not yet become waste. Reuse of a good involves immediate action to restore the object's function, to prevent it from becoming garbage. In more general terms it can be considered a way of life, a mental and cultural attitude that takes shape in daily life through small gestures of care. The set of these small gestures is transformed into a real economic activity that aims to repurpose and reinvent products that are still reusable.

RECYCLE = transforming, through industrial processes, a waste material into new raw material to be fed back into the production cycle. Recycling is essential to: reduce the amount of waste and



Funded by
the European Union

FITDigit

2022-1-FR01-KA220-EDU-000034740J

resources lost in landfills or incinerators; save energy needed to create new products from the raw material; reduce greenhouse gas emissions (pollution), the cause of global climate change; help sustain the environment for future generations. For recycling to happen, however, it is essential that the system of waste separation is rigorous, shared and efficient. We all need to do our part!

RENEW

Renewable materials is pivotal for a sustainable future Bio-based, compostable, and recyclable materials are fundamental for packaging solutions. By transitioning to renewable resources, we reduce our reliance on fossil fuels, lower carbon emissions, and support the development of a more sustainable materials industry.

RECOVER = energy recovery.

Much of the waste materials that cannot be reused or recycled can be incinerated and transformed into thermal or electrical energy through waste-to-energy plants, alternative locations to landfills. Activating a lifestyle based on the RULE of the 5 Rs' and a CIRCULAR ECONOMY that strongly opposes the throwaway culture is not easy, but nowadays is certainly urgent and necessary.

To learn more

<https://www.youtube.com/watch?v=IfySBNPXSoA>

<https://www.youtube.com/watch?v=kRnd37Nto18>



MODULE 4

THE IMPACT OF CIRCULAR ECONOMY ON THE ENVIRONMENT



We can define the circular economy as a new model of production and consumption aimed at extending the life of products and minimizing waste exploitation of primary resources.

Its pillars are the three Rs: Reduce, Reuse, Recycle.

It has emerged as a true economic revolution, the high road to walk on the path of sustainable development, which has the advantage that it can also be applied today to 'correct' the linear economy model followed to date that has done so much damage. The circular economy is therefore a reference of sustainable development, Agenda 2030, ecological and digital transition.

Social and economic benefits of the Circular Economy

The Circular Economy cannot be considered only as an approach to environmental sustainability and as a form of respect for the ecosystem, flora and fauna, but also and above all, as a method to exponentially increase the quality of life of individuals and society. The circular economy can therefore generate economic sustainability, a more real and efficient monetary profit than the current one, thus achieving high social sustainability through a more transparent and collaborative coexistence within the community. This is not a model that merely supports the current linear economy, but replaces it entirely at every stage of the production process, regenerating it and positively changing its structure, generating positive effects for citizens, the environment and the planet. To understand the importance of the circular economy, one must first consider some of the most pressing problems facing humanity in this era.

One of the relevant issues is definitely the overheating of the atmosphere caused by CO₂ emitted mainly for energy production, industrial activity and transportation.

Specifically, according to the IPCC (Intergovernmental Panel on Climate Change) study in October 2018, we have about 12 years to reduce CO₂ emissions by 50% and about 30 years to eliminate them totally. Otherwise, some of the effects that are already occurring will be amplified, with the devastating impact of droughts, fires and floods. Such events have already caused \$320 billion in damage in 2017.

Then there is the damage caused by air pollution to consider. According to the European Environmental Agency (EEA), air pollution continues to have significant impacts on the health of the population in Europe, especially for people in urban areas. The pollutants under observation, in terms of risk to human health, are particulate matter (Pm), nitrogen dioxide (NO₂) and ground-level ozone (O₃). Paying the price, as always, are citizens. Another particularly relevant issue is plastics and the harm resulting from their use. Only 15% of plastics are recycled globally (OECD 2018), 25% undergo energy recovery, and the remaining 60% end up in landfills

However, the circular economy is more than waste recycling: it is a broader concept that ultimately envisions a less sick environment that knows how to make the best use of the resources at its disposal. To understand the problem we are facing with today's development system, we can easily think of this: 64.4 million tons of plastics are produced each year in Europe, which in total has a value of 355 billion euros and of which only one third is recycled.

This leads to very high disposal costs; suffice it to say that at the European level the only cost for beach cleanup is 630 million euros, while globally it reaches 13 billion a year. These costs are increasing more and more; in Italy between 2010 and 2017, the waste management cost index grew by 16.3%, exponentially increasing the social hardship generated by the unaffordability of waste management costs.

A prime example is the capital of Italy, Rome, which will be forced to adopt the landfill system to manage the huge amount of waste in the urban area, as the alternative management costs have become unsustainable. Not only does the circular economy protect the environment and save on production and management costs, but it can also ensure profits for companies. According to the European Parliament, through measures such as waste prevention, ecodesign, and material reuse, European companies would achieve net savings of 600 billion euros, or 8% of annual turnover, while reducing total annual greenhouse gas emissions by 2-4%.

The Circular Economy is an excellent solution to all these problems; in fact, the right investment in circular waste management could generate a profit, both in monetary and social terms. Encouraging the practice of separate waste collection, in fact, creates the possibility of classifying waste according to its different recycling properties, thus encouraging its transformation into secondary raw materials. Indeed, the latter represent a new and more economical source of supply for those companies that are often unable to bear the price of raw materials, whose purchase and disposal costs are rising exponentially in many cases.

To learn more

<https://www.youtube.com/watch?v=IKowl9nKonw>

What are the benefits of the circular economy?

Protection of the environment: Reduces emissions, minimizes consumption of natural resources, and reduces waste generation.

Benefits on the local economy: encourages production models based on the reuse of nearby waste as raw material.

Encourages employment: stimulates the development of a new, more innovative and competitive industrial model, as well as greater economic and employment growth.

Encourages resource independence: Reuse of local resources leads to less dependence on imported raw materials.

The circular economy in the European Union

The development of the circular economy helps reduce resource use, waste generation and energy consumption. It can also play a role in the productive reorientation of countries. In addition to the environmental benefits, this emerging activity creates wealth and employment, including the social economy, worldwide. Each year in Europe, each person consumes about 14 tons of matter, producing 5 tons of waste, almost half of which ends up in landfills.

The circular economy and resource efficiency is a strong economic and business topic. In fact, the European Commission has adopted resource efficiency as a central pillar of its economic strategy. An integral part of the EU's approach to resource efficiency involves a shift from a linear economy-in which materials are extracted from the earth to make products, used and then disposed of-to a circular economy-in which waste and by-products, from the end-of-life of used products, re-enter the production cycle as secondary raw materials. Ultimately, the use of waste as the main source of reliable raw materials is essential for the European Union.

This strategy has been developed into a series of actions such as the publication in December 2015 of "The Missing Link-European Union Action Plan for the Circular Economy," which defines Europe's transition to a more circular economy. This action plan resulted in the circularity-oriented revision of the waste directives and the adoption of the new plastics directive.

Two new policy tools have recently seen the light of day in 2019 and 2020:

The "European Green Deal," which is the roadmap for equipping the EU with a sustainable economy, integrating systemic change that seeks a positive impact on the economy, the planet and people; The "New European Action Plan for the Circular Economy," which aims to adapt the economy to a green and low-carbon future, strengthening the EU's competitiveness, protecting the environment and giving new rights to consumers.

Conclusion: why is it important to adopt the circular economy ?

The current economic model is a linear model, based on "take-produce-consume-dispose." This model is environmentally aggressive and depletes the sources of supply of materials and energy. In addition, there is heavy dependence on raw materials in this type of economy, leading to associated supply risk, high and highly volatile prices, and a significant reduction in natural capital, in addition to the resulting economic losses. It is therefore necessary to initiate a transition from a linear economy to a circular economy.

MODULE 5

“GREENWASHING”: THE FALSE FRIEND OF THE CIRCULAR ECONOMY



Sustainable consumption and reducing one's environmental impact are increasingly important issues for the community, and many companies are meeting the needs of consumers by offering "**green**" and **eco-friendly**," environmentally conscious products.

But not everything that looks green really is!

The term greenwashing is an English neologism that combines the words "green" and "whitewashing." The term is also used in Italian and consists of the deceptive practice of passing off as sustainable and "eco-friendly" products, services and activities that actually have a negative impact on the environment in order to attract consumers.

Greenwashing is a deceptive marketing strategy that uses expressions and messages ostensibly close to the "green" world to advertise products on the market and sell more of them.

The first use of the term greenwashing dates back to the mid-1980s, when some scholars noted how hotels had begun to ask their guests to reuse towels, claiming that the choice was more environmentally sustainable than changing them daily, when in fact the motivation was purely economic in nature and had to do with a cut in operating costs (Hayward, 2009). Later such behaviors became more common and pervasive, with brands from a wide variety of sectors engaged in artfully constructing a green image of themselves and their products, in homage to the

social relevance that the environmental issue had on consumers to buy from nature-friendly brands.

How to recognize greenwashing?

To understand whether a product is truly eco-friendly or just greenwashing, one must pay attention to 7 alarm bells in advertisements and on labels

- 1) **Omission of information:** omitting information about whether a product is harmful. E.g., saying it is "sustainable" because it is made from recyclable materials, even though its production and transportation emit a large amount of greenhouse gases, which, however, are not mentioned.
- 2) **Lesser of evils:** advertise a positive initiative without focusing on the negative impact of everything else. E.g., many fast fashion chains advertise that they have eco-friendly clothing lines, while for the most part, however, they sell non-sustainable garments.
- 3) **Vagueness:** making an eco-friendly product appear by giving vague and inaccurate information. E.g., writing "100% natural" or declaring a cosmetic "organic" even though there is no agreed definition of "organic" in the beauty product industry.
- 4) **Misleading labels:** use labels that visually recall the "green" world but do not correspond to an actual certification of sustainability. E.g., using the color green or images of leaves, lawns and trees.
- 5) **Lack of evidence:** declaring that a particular product has sustainable or "eco-friendly" features providing neither evidence nor third-party certification to support the claim.
- 6) **Irrelevance:** giving information that makes a product appear more sustainable, but is irrelevant or unnecessary. E.g., specifying that a product does not contain a certain pollutant, even though in fact this is prohibited by law, always and in all products.
- 7) **False data:** presenting a product as sustainable with false claims, e.g., outright lies that are difficult for consumers to verify.

Examples of greenwashing

Coca Cola Zero Park Lives

Coca Cola organises several events and sports initiatives that help people fight obesity. In the global action, however, they left out one small detail; this beverage is full of sugar and fat. Paradoxical, isn't it?

Fighting greenwashing is essential to promote true sustainability and reduce the environmental impact of companies. The very definition of greenwashing damages consumer confidence and makes it difficult for companies that are genuinely concerned about the environment to emerge in the marketplace. For example, in addressing the problem of greenwashing, authorities in some countries are introducing stricter regulations. In the United States, the Federal Trade Commission (FTC) issued guidelines for the use of environmental marketing claims in 2010. In Europe, the EU Taxonomy and other directives aim to clearly define what is truly environmentally sustainable. However, the responsibility does not lie with the authorities alone. Consumers and investors must be vigilant and informed, seeking reliable certifications and asking questions when necessary.



To learn more

<https://www.youtube.com/watch?v=0XGAMJsm6Tg>

MODULE 6

CIRCULARITY IS POSSIBLE: SUCCESSFUL STORIES OF BUSINESS



The circular economy is based on three principles

- ✓ Eliminate waste and pollution
- ✓ Circulate products and materials (to their highest value)
- ✓ Regenerate nature

The first principle of the circular economy is to eliminate waste and pollution. Currently, our economy operates on a "take-make-waste" system. We take raw materials from the Earth, make products from them, and eventually throw them away as waste. Much of this waste ends up in landfills or incinerators and is lost. This system cannot work in the long run because our planet's resources are limited. For many products on the market, there is no life path after their use.

For this example, let's take the case of a package of crisps. These plastic packages cannot be reused, recycled or composted, so they end up as waste. Products such as these are not designed to be disposable. Waste is therefore unavoidable in certain situations and this is due to the the result of design choices. One must remember that there is no such thing as waste in nature. From

tiny, short-lived products like crisp packages to seemingly permanent structures like buildings and roads. Our economy is full of things that were designed without questioning what will happen to this product at the end of its lifecycle.

By changing our mindset, we can treat waste as a design flaw. In a circular economy, a specification for any design is that materials re-enter the economy at the end of their use. In this way, we take the linear take-make-waste system and make it circular.

Many products could be brought into circulation through maintenance, sharing, reuse, repair, reconditioning, remanufacturing and, as a last resort, recycling. Food and other biological materials that can be safely returned to nature can regenerate the soil, fueling the production of new food and materials. With a focus on design, the concept of waste can be eliminated.

Companies around the world have been rethinking the way they design, make and remake their products. The transition from the current linear economy to a more circular one requires dramatic changes in the way we look at materials and products.

Business models often cited as facilitators of the circular economy are called Product-Service Systems (PSS).

Today, most manufacturers sell their products to their customers, making the customer the owner of the product. In a product-as-a-service model this would not happen. Rather, manufacturers or retailers would remain the product owners, while customers would pay a fee to use the product for a given period of time.

The manufacturer becomes a service provider and remains responsible for the operation of the product (including maintenance and repair) and for the cost of disposal and waste treatment at its end of life. In this way, product-as-a-service systems provide an incentive for companies to choose more durable products that are easy to maintain, repair, and upgrade. Product obsolescence would be strongly discouraged, rather than consciously inserted to spur sales, as is the case in the linear system. This is why product-as-a-service systems are often proposed as suitable business models for the circular economy. The advantage for the customer is that he does not have to pay the full price of the product up front to have full possession of the product; rather, he only pays for its use. The consumer is no longer burdened with the cost of maintenance and repair and becomes part of the deal. As for companies, a PSS allows them to maintain closer contact with the customer and their products. By remaining owners of the products, they also remain owners of the valuable parts and materials within them. This means they can reuse or recycle the product when the use contract ends, leaving them less dependent on fluctuations in supplies and the price of materials on the world market.

The main reason these systems are considered to have a high potential for circularity is that they decouple revenue generation from consumption and waste of materials and product. The products themselves can be used by multiple users before they reach their end of life. Many examples of Product-Service Systems are already available in the marketplace.

Some of them may not be that new at all: think of a library, where you can rent books after paying a modest subscription fee, or a car-sharing service where you pay by the kilometer. Others may be less common: why not rent clothes from a clothes library or pay per wash cycle?

Circularity begins with product design. Product design is much more than the color of a jacket or the placement of buttons on a coffee maker. It determines the entire construction of a device, inside and out. Design choices determine the type and amount of raw materials that are used to build the product and how the product is assembled. These choices determine not only the appearance and functionality of the product, but also the ease with which it can be dismantled and reassembled, repaired, and recycled.

Product design does not happen by accident. Manufacturers might use certain parts or materials to add functionality, improve the user experience, extend or shorten the life of their product, or make it easier or more difficult to replace components.

Several design strategies support the transition to a circular economy by increasing the life of a product, enabling repair, or facilitating the reuse of parts. A list of circular design strategies is shown below:

DESIGN FOR DURABILITY AND REPAIR

Some products are designed to last. Durable, high-quality materials are combined with solid assembly methods to ensure that the product can withstand wear and tear and remain functional for a long time. This approach is often combined for easy maintenance and repairability, for example, by constructing products in such a way that they can be easily disassembled for maintenance or repair (e.g., interlocking or screwing parts instead of gluing them together, using replaceable parts, washable coatings, etc.). Choosing basic colors and simple decorative patterns also makes the design timeless and less dependent on fashion trends. These products are often sold at a premium price.

Some brands offer repair kits, replacement parts, or handbooks to encourage repair. Some brands also run a take-back program for used garments and resell them on a second-hand platform.

<https://www.patagonia.com/home/>

DEMATERIALIZATION

When you 'dematerialise' a product, less material is used to make it, such as by miniaturising some components or using hollow structures to save in weight and materials. When this strategy is taken to the extreme, no material is used at all! This is possible if you turn a product into a service, offering the user only access or functionality. Example of this is Spotify, a digital music streaming service that gives access to millions of songs without owning a single CD. By paying a monthly fee, the user can listen to any type of music, song, album anytime, anywhere.

<https://www.spotify.com/>

MODULAR DESIGN

Products can be designed so that they are a collection of separate parts, or modules, that can be disconnected and replaced independently of each other. In some cases, modules can even be rearranged into new configurations, such as in the case of modular furniture.

The Fairphone is a modular smartphone in which every component—from the battery to the camera to the screen—can be replaced if necessary. This avoids having to buy a whole new phone every time one of these elements breaks, wears out, or needs to be upgraded. You can simply replace it by ordering a replacement part and taking advantage of the repair tutorials made available.

To learn more

<https://www.fairphone.com/en/>

SMART CHOICE OF MATERIALS

Products can help close material circles if they are made from renewable or recyclable materials rather than virgin resources, or from materials that are biodegradable or easy to recycle. Obviously, the choice of materials should align with the functionality and expected lifespan of the product. Making a biodegradable bicycle is probably not a good idea, but it can be made from recycled metals and plastics. Where reusable packaging can be made from high-quality plastics or metals, single-use packaging would benefit from being compostable or easy to recycle. Edible PRO is an Indian company developing edible spoons to replace single-use plastic cutlery. The spoons are made of a millet flour and can be eaten like crackers once you have finished eating a take-out meal.

To learn more <https://ediblepro.com/>

Apeel is a company that has come up with an innovative way to eliminate single-use shrink plastic packaging on fresh fruits and vegetables while combating food waste. Apeel is a plant-derived edible coating layer applied to fresh produce that mimics and enhances the natural defenses of fruits and vegetables. This slows down the two main things that cause spoilage: water loss and oxidation.

To learn more <https://www.youtube.com/watch?v=PvAd7t33fdo>

Many companies are adopting reusable packaging as a way to eliminate waste, while some, like Lush and many others, simply sell products without packaging. Lush has redesigned some of its liquid personal care products to sell them as solid formulations that replace liquid products in plastic bottles. Their "naked" range now includes shampoo, conditioner, bubble bath, toner, and deodorant.

Eliminating waste and pollution is not limited to packaging. Textile company DyeCoo has developed technology to dye fabrics without using water and thus eliminate toxic wastewater. Instead of water, DyeCoo uses carbon dioxide as a solvent in a closed-loop system. Although the capital investment in the equipment is greater than in conventional dyeing, the company reports that operating costs can be reduced due to short batch cycles, efficient use of dye, and no wastewater treatment. The technology can also reduce health and safety risks by minimising worker exposure to toxic chemicals.

One of the DyeCoo machines can process 800 tons of polyester per year, effectively saving 32 million liters of water, avoiding the use of 160 tons of chemicals and completely eliminating the release of wastewater into the natural environment.

By adopting this first principle of the circular economy, we can begin to close the materials cycle and turn off the tap that sends a torrent of waste to landfills and incinerators every day. By emphasizing upstream design, we can stop waste before it is even created. The second principle of the circular economy is to circulate products and materials at their highest value. This means keeping materials in use, either as a product or, when it can no longer be used, as components or raw materials. In this way nothing becomes waste and the intrinsic value of products and materials is preserved.

There are several ways in which products and materials can be kept in circulation, and it is useful to think of two basic cycles: the technical cycle and the biological cycle.

In the technical cycle, products are reused, repaired, remanufactured and recycled.

In the biological cycle, biodegradable materials are returned to the earth through processes such as composting and anaerobic digestion.

To learn more <https://www.youtube.com/watch?v=Lc-FQvPO89Y&t=6s>

The Technical cycle

The most effective way to preserve the value of products is to store them and reuse them. Take a telephone, for example: it is worth much more as a telephone than as a pile of components and materials. So the first steps in the technical cycle focus on maintaining the integrity of products to preserve as much value as possible. This could include sharing-based business models so that users have access to a product rather than owning it and more people can use it over time. It could involve reuse through resale. It could mean cycles of maintenance, repair, and refurbishment.

Eventually, when the product can no longer be used, its components can be remanufactured. Parts that cannot be remanufactured can be broken down into their component materials and recycled. Although recycling is the option of last resort because it involves the loss of value inherent in products and components, it is vital as the final step that allows materials to remain in the economy and not end up as waste.

The Biological cycle

Biodegradable materials that cannot be reused, such as some food by-products, can be fed back into the economy in the biological cycle. By composting or anaerobically digesting organic materials, valuable nutrients, such as nitrogen, phosphorus, potassium, and micronutrients, can be used to help regenerate the soil so that more food or renewable materials can be grown such as cotton and wood.

Some products, such as cotton clothing or wooden furniture, can be circulated through both the technical and biological cycles. They can be maintained, reused, repaired and sometimes even recycled, but eventually they can be returned to the biological cycle from which they came. Composted or anaerobically digested, they can feed the soil to grow new cotton or wood.

To learn more <https://www.youtube.com/watch?v=NBvJwTxs4w&t=42s>

Design is the key to success

For products to successfully circulate in both the biological and technical cycles, it is essential that they be designed with their eventual circulation in mind. There are many products in our current economy that cannot be circulated in either cycle and end up as waste. There are products that blend technical and biological materials in such a way that we cannot separate them and put them into circulation, for example, textiles that mix natural fibers and plastics. If designers thought about how their product could fit into technical or biological cycles after use, that product could be made with that path forward in mind. For example, products intended for technical cycles would benefit from being easy to repair and maintain, easy to disassemble, and made of modular components that can be replaced. They could be durable enough to withstand the wear and tear of many users. And they could be made of easily recyclable materials.

If products such as wooden furniture were designed—as well as easy to maintain and repair—with the biological cycle in mind, their biodegradable materials (such as wood) would be easily separated from technical materials (such as screws) and glues and paints would be biodegradable. Other products, such as take-out food containers, can be designed to be compostable after one use so as to increase the chances of food scraps in them returning to the soil.

Examples of companies designing for circulation

There are many innovative companies that already design their products with recirculation in mind. Ecovative makes compostable packaging from agricultural byproducts (the parts of crops that cannot be eaten) and mycelium (mushroom roots). The packaging works like expanded polystyrene to protect fragile items during transport, but it comes from a renewable source and does not contribute to the production of plastic waste. Mycelium is a fungal network of thread-like cells that acts as a natural self-assembling glue. It grows in 5 to 7 days without the need for light or water, digesting agricultural by-products and binding into whatever form is needed.

At the end of the process, the material undergoes a dewatering and heat treatment process to stop its growth and ensure the absence of spores or allergens. Once used, it can be safely composted and returned to the soil.

Resortecs has developed an innovative solution to improve the recycling of sewn garments such as jeans and jackets that must be disassembled before their component materials can be recycled. The current disassembly process is time-consuming and costly because the garment and its components are held together by a high-strength synthetic thread, in most cases made of polyester. Before recycling, the garment pieces must be separated and the thread removed, otherwise the quality of the recycled product will be compromised. Resortecs has designed a dissolvable thread, facilitating the disassembly process and helping to keep textiles in the economy.

Resortecs threads are melted using a commercial oven and are available for different melting points (150°C, 170°C and 200°C) depending on the type of garment to be disassembled. The Resortecs solution allows up to 500 kg of garments to be disassembled simultaneously.

Many companies are adopting reusable packaging as a way to keep materials in circulation. Loop, which operates in France, the United Kingdom, and the United States, is a reuse platform that offers products from major brands such as Tide detergent and Heinz Ketchup, in reusable packaging. When a container is empty, there is no need for the customer to clean or sort it. It is picked up at home or can be delivered to participating stores. The containers are then professionally cleaned, filled and reused. It is time for action!

By adopting the second principle of the circular economy - circulating products and materials - we retain the value inherent in products and the materials of which they are made. In this way, we keep finished materials in the economy and out of the environment, and safely return biodegradable materials to the earth.

The third principle of the circular economy is to regenerate nature. By moving from a linear take-make-waste economy to a circular economy, we support natural processes and leave more room for nature to thrive. By shifting our economy from linear to circular, we shift the focus from extraction to regeneration. Instead of continuously degrading nature, we build natural capital. We use agricultural practices that allow nature to rebuild soils, increase biodiversity, and return biological materials to the earth. Currently, most of these materials are lost after use and the land used to cultivate them is depleted of nutrients. If we shift to a regenerative model, we will begin to emulate natural systems.

The most obvious starting point when moving to an economy that regenerates nature is the food industry. The way we produce food today is a significant factor in both climate change and biodiversity loss. It relies on ever-increasing amounts of synthetic fertilizers, pesticides, fossil fuels, fresh water and other limited resources. These are a source of pollution and damage to ecosystems and human health.

By producing our food regeneratively, the goal is to improve soil health. Regenerative agricultural practices can significantly reduce greenhouse gas emissions from food production by reducing reliance on synthetic inputs and building healthy soils that absorb rather than release carbon. In addition to helping restore the natural carbon cycle, healthy soils are better able to retain water, reducing the impact of drought, and are better able to absorb water, reducing the risk of flooding.

These regenerative food production practices include agroecology, conservation agriculture and agroforestry (growing trees around or between crops or pastures). This results in farmland that more closely resembles natural ecosystems such as native forests and grasslands, providing habitat for a wide range of organisms, thereby increasing biodiversity. By reducing the need for synthetic inputs, pesticides, pollinators and microbes in the soil, which are essential for maintaining healthy ecosystems, biodiversity can thrive.

In addition to the food system, there are other benefits to natural ecosystems by adopting a circular economy. By keeping products and materials in use, less land is needed for the supply of virgin raw materials, such as from mines. If we gradually decouple economic activity from material

extraction by keeping materials in circulation after use, more and more land can be returned to nature and renaturalisation can occur.

In a circular economy, land dedicated to materials supply will increasingly be focused on renewable, regeneratively grown resources rather than on the extraction of finished materials which will increasingly remain in circulation. All of this will be supported by a transition to 100 % renewable energy, produced using infrastructure designed for reuse, repair, remanufacturing, and recycling.

Towards climate change

The transition to renewable energy alone will address only 55% of global greenhouse gas emissions. The rest comes from the way we produce, use products, food and manage land: this is where the 'circular economy' approach is fundamental. The economic, health and environmental benefits of a circular economy for food alone would be worth \$2.7 trillion a year by 2050. By adopting circular economy principles, the food industry could cut its projected greenhouse gas emissions in half by 2050.

Examples of farms regenerating nature

Connect the Dots is a city-led initiative to promote local regenerative agriculture in rural São Paulo state, protecting natural systems threatened by urban sprawl and conventional farming practices. The city buys produce from local farmers to provide healthy food to vulnerable people. It does so at a price 30 % above market value to incentivise the transition to regenerative practices and promote social inclusion. Natura is the largest cosmetics company in South America and the fifth largest beauty products company in the world. It produces a wide range of products including soaps, creams and shampoos, all of which rely on the Amazon's rich biodiversity for ingredients and materials, as well as the "biointelligence" of indigenous communities. The company's supply chain includes nearly 40 types of 'biodiversity resources' (plant-derived ingredients) and the involvement of about 7,000 families.

A key element of Natura's business model is the concept of the "standing forest" economy. Simply put, this means that a tree has much more economic value standing than felled. This philosophy has preserved more than 2 million hectares of Amazon rainforest, with the goal of increasing this area to 3 million hectares by 2030.

The principle of regenerating nature is not limited to the land but can also be applied to the ocean. GreenWave's 3D ocean farming method produces a mixture of shellfish and algae in a nature-friendly way. It consists of a simple grid of ropes and baskets suspended just below the surface, with species growing at different depths. This approach can be used for commercial farming of products used for food, fertilizer, animal feed and bioplastics, while restoring marine ecosystems.

Regenerative ocean farms can also increase marine biodiversity. Farm assemblages mimic the vertical structure of an oceanic coral reef, providing layers of diverse habitats for a wide variety of marine species.

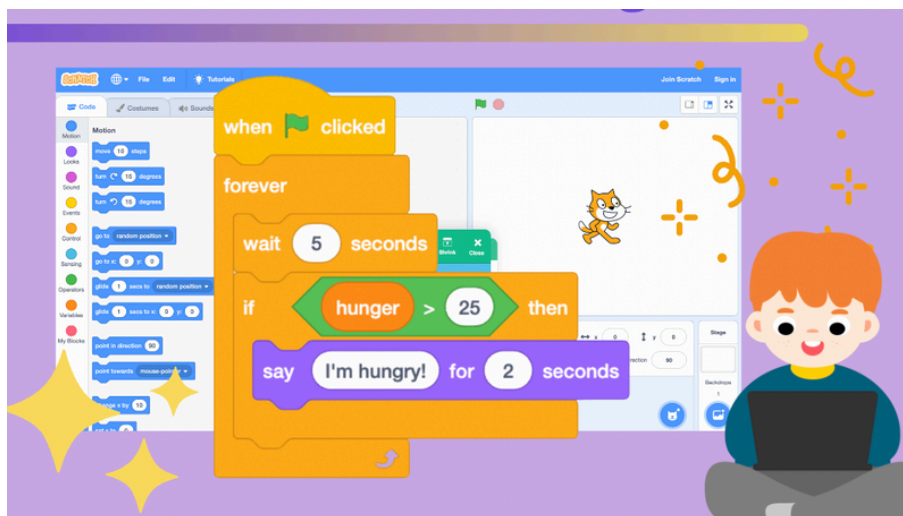
The 3D method of regenerative ocean farming is very effective because it groups a number of enterprises on top of each other, creating abundance in a small area. Because it is quite simple, start-up costs are low. Anyone with access to 20 acres and a boat can start a farm for \$20,000 to \$50,000, producing about 60,000 kilograms of seaweed and 250,000 shellfish each year. Moving forward

By adopting the third principle of the circular economy-regenerating nature-we can shift our priorities. Our focus should no longer be simply on reducing damage to the environment, but on how we can actively improve it. If the economy follows circular principles, the more we do, the greater the benefits.

<https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/examples>

Modulo 7

MAKING E-CODING EXERCICES



WHAT ABOUT CODING?

Coding means "computer programming" it's really fun and you can learn (by playing) the basic concepts of computer science and computational thinking.

It was the computer scientist Jeannette Wing who brought the term "coding" to the attention of the scientific community in a 2006 article and defined it as the fourth basic skill together with reading, writing and counting, indispensable for everyone, outstanding in everyday life.

Therefore, it is currently possible to understand coding as a new language, which allows you to "dialogue" with the computer in order to give it tasks and commands in a simple way.

This means that if children play programming, they learn, at the same time, to use logic to solve problems and to develop "computational thinking", i.e. a logical-creative process that allows a

complex problem to be broken down into different parts, in order to tackle it , more easily, one little piece at a time.

With the computer or tablet you can create interactive games and exercises to make the characters on the screen carry out actions useful for achieving a goal.

Simply move blocks, bricks or graphic objects on the monitor, creating a sequence that allows the chosen character to complete the level. Each block corresponds to a code in JavaScript, one of the most used programming languages in the world, which however in this way it is not necessary to type.

On the internet there are numerous platforms that teach how to write and use programming code. These include [Code.org](https://code.org) where you learn to overcome challenges and solve problems with games and videos. On code.org you can find the basic modality called "The Hour of Code", which consists of carrying out just one hour of training in "computational thinking".

Another fun platform is [Scratch](https://scratch.mit.edu) which allows you to create interactive stories, video games and other animations to share with other members of the community using blocks and without writing any lines of code.

At school , coding is extremely useful for developing several related skills:

- It allows you to acquire transversal skills given by memory, concentration and logic.
- Stimulates the aptitude for problem solving through the autonomous search for new solutions in the face of trial and error.
- Promotes the development of logical and creative processes by breaking down problems into several parts for step-by-step resolution;
- Develops the three phases of computational thinking, from the formulation of the problem to its solution, up to the final resolution and a posteriori evaluation.

In the future, digital skills will be increasingly useful for today's young people, digitalisation is destined to grow and society to adapt accordingly, guaranteeing excellent job opportunities for those who know how to actively interact with technology. Finally, computational thinking and coding bring together an entire community at an international and global level, regardless of linguistic and sector constraints.

Coding is gaining more and more importance, actually, the [European Code Week](https://code.org) was established bringing together a series of international initiatives and school events concerning coding in schools.

In this way it is possible to learn about tools and consult activities for the development of teaching skills related to computational thinking.

The various annual editions relating to this initiative are each focused on specific themes. The use of these themes is a progressive awareness of the educational value of computational thinking as a transversal skill.



SECOND SECTION IN THE CLASSROOM

Module 1 - ENVIRONMENTAL EDUCATION AND THE CHALLENGES OF SUSTAINABILITY

Activity 1:

- Viewing the film-documentary Anthropocene a feature-length film that juxtaposes images of beautiful nature and those of the devastation of man in all parts of the world, even in the most remote and theoretically pristine areas of the planet.

To learn more

<https://www.cineprof.com/project/antropocene-2018/>

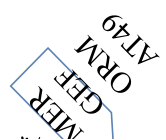
- Reflection and filling out of chart on the film, asking students to put in writing the scenes that struck them most, explaining why, identifying connections to other books, films, images even trying come up with an alternative title for the film.

ATTACHED 1

NameClass..... Date

FILM PROFILE

1. Before watching the film, answer these questions:
2. Is the title interesting?
3. Are you curious?
4. Why ?
5. What do you imagine about the plot?
6. What does the Anthropocene mean in your opinion? What do you expect?
7. Do you usually like documentaries?





ANALYSIS SHEET OF A FILM

We present you with an analysis sheet to fill out at the end of watching a film (or as a homework reminder.)

GENERAL DATA

- FILM TITLE:
- DIRECTOR:
- COUNTRY OF PRODUCTION:
- YEAR OF PRODUCTION (period in which the film was shot):
- YEAR OF SETTING:
- MAIN ACTORS:

FILM GENRE

Indicate whether it is a western film, detective story, musical, horror, adventure, science fiction, animated, fantasy, comedy, drama, sentimental, documentary

.....
Possibly literary source (is it based on a book?)

.....

PLOT, SETTING, CHARACTERS

Write the PLOT briefly:

.....

INDICATE IF THE FACTS ARE NARRATED:

- in chronological order
- e n t i r e l y i n f l a s h b a c k
- with alternating temporal planes (present plane, flashback, anticipation of future events)
- Place and time of the story:
- In what period does the story take place (from):
- Protagonist (physical, behavioral, socio-cultural, psychological characteristics)

Other characters:

main:

secondary:

MESSAGE

Explain the message of the film:

.....

LANGUAGE

- Analyzes the cinematographic language (particular shots, camera movements, lighting effects, use of color, rhythm of the narrative.):

.....

- Analyze the screenplay (dialogue, coherence of the plot and characters):

.....





- Analyze the soundtrack (original, with already known songs, strong or weak support for the images, any sound effects ...)

.....

PERSONAL JUDGMENT

- Did you like the film?

YES, because

.....

No, because

.....

- Which episodes, in particular, did you like?
-

- Which scene from the film left the biggest impression on you and why?
-

- What feelings (sympathy, antipathy, indifference...) did the characters arouse in you?:
-

- Which character (positively or negatively) particularly impressed you and why?
-

- Did you find the ending convincing or would you have preferred another?
-

- Do you agree with the message of the film?
-

- Did you like the actors' performances? Which one most of all and why?
-

CONCLUSION

1. Is there a conclusion or do you think it's an open ending?
2. How did the events end?
3. Would you suggest this movie to another person?
4. If so why?
5. Imagine another title for the film

Activity 2:

- Group discussion

Students are asked to summarise the major sustainability challenges facing our world today and write them on a whiteboard.

Potential answers: CO₂ emissions from growing industry, depletion of limited resources, pollution, overconsumption, waste generation, etc.

Students reflect on potential solutions for each of the challenges and note them on a chart.

Challenge	Solution	Topic Information
-----------	----------	-------------------





<p>Limited resources</p>	<p>The use of renewable resources</p>	<p>Examples: wooden toys instead of plastic, bioplastic packaging,...</p> <p>Is 'bio-based' really increasingly sustainable? It is not?</p> <p>The production of bio-based raw materials itself presents problems of sustainability, such as the use of land, water, fertilizers and pesticides. The use of land is an area of particular debate given that the cultivation of biomass for bioplastics production and other uses could create competition with arable land for food production. Bio-based raw materials are renewable only to a limited extent since the amount of biomass that can be produced sustainably is itself limited; farmland and water are also finite resources.</p>
<p>Production of waste</p>	<p>Recycling of waste</p>	<p>Obviously, recycling is very useful and allows us to save on raw materials. However, recycling often leads to materials of inferior nature that can only be used in low-value products (downward cycle). An example is the recycling of mixed plastics: they cannot be turned into high-quality plastic granules and are reused for street furniture.</p> <p>Even the best recycling processes cannot prevent the loss of material and value. A typical example is the recycling of aluminum beverage cans. Collection systems for these cans are well established, and aluminum can be recycled at a very high efficiency rate.</p> <p>Nevertheless, within a few years most of the aluminum will be lost due to cumulative losses. The following videos are very illustrative:</p> <p>How are tin cans recycled? To learn more https://www.youtube.com/watch?v=KmMP67eC2tg</p> <p>Is recycling an example of linear economy? To learn more https://www.youtube.com/watch?v=RX14rA-tylo</p>
	<p>Extending the durability of products</p>	<p>Many products do not last very long as they break quickly and cannot be repaired. How can we make products more durable? And, if we used the products longer, would that hinder innovation and technological advancements? Can we design products so that they are easier to maintain,</p>





		<p>dismantle and repair? Can we make them modular or upgradeable so that we no longer need to immediately buy a new console to play the latest video games? Would you be willing to pay more for a product that lasts longer and can be repaired?</p> <p>Interesting sources: the Ifixit manifesto, "If you can't fix it, you don't feel it's yours!"</p> <p>To learn more " https://www.ifixit.com/Manifesto</p>
CO ₂ emission	Increasing levels of efficiency	<p>If we produce more efficiently, we use fewer resources and create less waste per unit produced. However, does this also reduce the absolute number of resources used? One consequence of more efficient production is typically a drop in production costs, making the products cheaper and more affordable for consumers. This can in turn lead to an increase in consumption. For example, when cars were made by hand, only very few people could afford one. As soon as Henry Ford invented mass production of automobiles, cars became affordable to the general public, leading to an increase in production volumes and in the use of resources. Efficiency gains lead to absolute reductions in resource use and waste only if efficiency gains are not overridden by increased consumption.</p>
Excessive consumption of a product	Decreasing use of products	<p>Of course we could all make our lifestyles more sustainable: use fewer products and store the ones we have for a longer period of time. This saves money and resources, but it would also put pressure on our economy with manufacturers and stores seeing lower sales, and many people could lose their jobs. In addition, it is not easy to motivate people to buy less. Can you think of a way to make people buy fewer products, but still keep the economy running? What if we could switch from owning things to using services? EXAMPLES: a car-sharing subscription instead of buying a car; a music streaming service instead of buying CDs; clothing rental shop instead of buying the latest fashion. This would maintain consumption (and the economy) while reducing the use of materials as products are shared among many users.</p>
Pollution	More stringent	In Europe, we have stringent environmental



	Legislation	legislation. Nevertheless, many of the products we use are made outside Europe, mainly in Asia, where regulations are less strict. How can we influence foreign production? Would you be willing to pay more for a product that is environmentally sustainable? And how to know if it really is?
Sustainable consumption	Eco-labelling	What eco-labels do you know? And do you know what they mean? Is it easy for you as a consumer to make an informed choice between two different products? Would you be willing to pay more for a product that is environmentally sustainable? How can environmentally sustainable products become affordable for low-income consumers?

After reflecting on the different views on how to solve the challenges imposed, it becomes clear to the class that we must radically change the way we produce and consume products if we are to create a sustainable economy that operates within the limits of our planet.

Activity 3:

- Video viewing: to be determined
- At the end of the video, students are asked if there is a solution when the 'take-create-throw' model can not be applied.

<https://sustainability-success.com/importance-of-sustainable-development/>

Ask your students what examples they can provide from their everyday life that can reflect the circular economy. Some examples are:

- Reuse: platforms or stores for second-hand items, collections of clothes for reuse, flea markets
- Sharing: car sharing services, tool rental services, libraries of clothes
- Repair: cell phone repair stores, appliance repair shop
- Reconditioning and the recreation of ascending cycles: bags and purses made from rubber tires (e.g., Freitag), furniture repurposing
- Recycling: fleece jackets from recycled plastic bottles, clothing from recycled fibers, collecting waste sorting to recycle materials
- Biobased materials: bioplastic sporting goods

At the end of the activity, students will have achieved the following objectives and consolidated the following skills:

- ✓ Awareness of the main sustainability challenges (air pollution, water pollution, soil, waste management, food waste, biodiversity)
- ✓ Knowledge of the phenomena of climate change and global warming

- ✓ Ability to propose concrete and relevant examples related to the issues addressed and formulate potential solutions
- ✓ Ability to work together with peers, collaborating and harnessing heterogeneous skills and knowledge to achieve a common goal
- ✓ Ability to do research on a topic using reliable sources and materials
- ✓ Critical thinking on main topics such as sustainability and circular economy.

MODULE 2 - COMPARING LINEAR AND CIRCULAR ECONOMY

In this module, students are challenged to take a closer look at our current linear economy and think about how it could be transformed into a more appropriate system.

The teacher briefly introduces the topic for example how raw materials such as oil, minerals and metals are extracted and used to create products. It is then highlighted how, after their use, these are simply thrown away. This 'take-create-throw-away' approach has given us our standards of living, our wealth and our comfort. The current linear model also leads to social inequality, depletion of natural resources, environmental pollution and contributes to climate change. Of course, it is important to underline that some of the waste man creates is collected and recycled.

Too often, recycled materials are of inferior quality and can only be used for less valuable applications. So although the recycling society manages to keep some of the materials within the economy, it cannot prevent losses of material and value.

This way of operating is not sustainable. It is time to change the way we think about materials, products and waste!

The activities presented in this module encourage group discussion on consumption patterns, resource scarcity and waste management. Students reinforce critical thinking and elaborate possible solutions to the current linear take-care-throw system.

The concept of circular economy is thoroughly examined as a possible solution for the future.

Activity 1 : In this activity, students critically examine the current linear economy built around a 'take-it-for-grant-it' worldview.

They explore the circular economy and how it can contribute to the creation of a sustainable world in which waste no longer exists but becomes the raw material for the next production cycle.

- Brainstorming "What do you think of when you hear the words Linear Economy? What does 'Circular Economy' make you think of?"

This activity is conducted using Mentimeter, followed by a guided discussion

<https://www.mentimeter.com/>

- Introduction to the concept of linear economy, the indiscriminate, wild, and very rapid use of resources, giving some examples, particularly related to everyday objects (yogurt in



plastic jars, toothpaste, cherry tomatoes in hard plastic packaging) and the issue of over-packaging.

- Fortunately, however, this is not the only possible economic model. There is a way out, a possibility for change. And it is called the **circular economy**: an economic model that requires upstream design so that waste from a product or process can and should become a resource for a new product or process.
- Students create a mind map of things they already know about the circular economy. Post-it notes are distributed and students are asked to individually jot down possible questions/curiosities they might have on the topic.

Questions raised are ranked by students from most to least interesting, repositioning or grouping them on a poster board.

At the end of the discussion, students agree on the ranking and take a picture of the map and the ranked questions, which will serve as a guide for subsequent meetings.

Viewing of videos:

<https://www.youtube.com/watch?v=eOgXxTj5kGk>

https://www.youtube.com/watch?v=_0Spwj8DkM

https://www.youtube.com/watch?v=_9mHi93n2AI

<https://www.youtube.com/watch?v=zCRKvDyyHmI>

<https://www.youtube.com/watch?v=rRRF0qAqh2Q>

Activity 2: Based on the video, students recap the basic principles of the circular economy by integrating with their personal knowledge on the subject. They annotate the key words using a free app to create word patterns <https://wordart.com/>

Activity 3: Thematic questionnaire

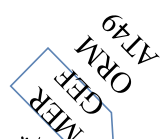
At the end of classroom activities, students will have achieved the following objectives and consolidated the following skills:

- ✓ Know how to describe the difference between linear and circular economy;
- ✓ Know how to list the basic concepts and strategies of a circular economy, such as the concept of longer use, repair, reuse, shared use and recycling;
- ✓ Know how to translate theoretical concepts and definitions on circular economy into practical actions and examples from everyday life;
- ✓ Ability to organize and expound information and arguments while adhering to a set time frame.

MODULE 3- THE Rs OF THE CIRCULAR ECONOMY

https://www.mercatocircolare.it/errando/regole_gioco.php

Activity 1:



- Brainstorming : brainstorming on the meaning of Circular Economy.

Students examine the word "cycle." After attempting to elaborate a correct definition, the most accurate one is chosen.

During this first phase, the activity is introduced by stimulating collective reflection on the Rs of Circular Economy asking students to think of their personal experiences.

For example, if a male or female student plays sports or goes hiking, you can ask them if they use a water bottle when they train or during their treks; they have ever thought of also using it at school or in the city instead of plastic bottles.

Or you can ask them when was the last time they reused an old piece of clothing to create new accessories to wear. You can reason with students that being circular and sustainable can mean much more than just sorting. Questions like 'do you or your family members prefer glass to plastic?', 'how many at home use a carbonator instead of buying bottles of sparkling water and soda?', 'do people store at zero-waste stores?', 'do people reuse food scraps to create compost, beauty products?', are all great ice-breakers.

Activity 2:

The familiarization with the R approach (reduce, reuse, recycle) to demonstrate how men can curb linear consumption processes, reduce waste by making informed and responsible choices in their daily lives. Students are asked to find other R-verbs for sustainability in addition to the ones proposed and establish a hierarchy based on priorities from the most to the least impactful, environmentally. Students elaborate how to raise awareness of the Rs concerning the circular economy with fun and informative content. If they had a choice, what would they make? A brochure? A comic book? A magazine? A video game? Students' ideas are collected on the blackboard. Once the brainstorming activity is concluded, the class is prompted to create a short dissemination video on one of the R's of the circular economy.

The class is divided into small groups of three or four students so that everyone can actively participate in creating the video by giving their input.

Students can be shown some example videos for inspiration, such as this video tutorial on reuse

<https://www.youtube.com/watch?v=2zZLZHjUE4I>

or the video on recycling, <https://www.youtube.com/watch?v=iTWJxTXItV4>

https://www.youtube.com/watch?v=2mH8_ckhXbs

In this activity, students are encouraged to elaborate content freely using an important skill like creativity. The teacher, acting as a didactic support allows students to choose one or two topics of circular economy (Rs) or can decide to assign a specific theme. For example: Group A will be asked to create a video on the concept of "Reduce," while Group B is asked to choose an environmentally important topic and make a video on it.

- ✓ In order to make the video, students can use the following guiding questions:
- ✓ what aspects of the circular economy do we want to highlight? For example, recycling, consumption levels, material reuse, etc.

While elaborating video, students should ask themselves the following questions:

- **Audience:** who is our target group (peers, classmates, elementary school children, parents and adults in general, etc.)?;
- **Entertainment:** how can we make our video fun and engaging? (use of background music, use of colloquial language, style, musicality, rythmn).
- **Usefulness:** what useful tips or important information can we convey with our video? E.g. where to collect spent batteries in our municipality, how to recycle an item, etc.
- **Technical aspects:** it is sufficient to use a smartphone for filming. For editing, groups can use the free smartphone software InShot, which can be downloaded on iOS and Android or other.

Teachers remind students to avoid showing their faces since activity includes minors. A solution could be the use of emoji to their faces on the video and/or all digital material produced.

The video should be short, effective and immediate and no longer than two minutes

Finally, the groups explain which of the R's they chose to address in their video, the message they wanted to disseminate, and which target audience they addressed.

The last phase includes the showing of the videos to the rest of the classes with subsequent upload on school's website and/or social pages.

Lastly, the teacher asks students to complete an assessment chart (level of participation, interestcontent, skills used, usefulness, information acquired, feedback.

Activity 3: students apply acquired content by playing an interactive videogame.

<https://ecogiochi.fondazioneamga.org/index.html>

<https://climatekids.nasa.gov/air-pollution/>

Activity 4: an immersive journey in A PLASTIC WONDERLAND.

The 'Plastic Wonderland' is an immersive experience to raise awareness of the value of plastics and recycling possibilities. By means of a mouse, students begin their journey into the world of recycling. Join in and click on the link to travel into the virtual world of plastic !

<https://www.corepla.it/scuola/plastic-wonderland-il-meraviglioso-mondo-del-riciclo>

At the end of the activity, students will have achieved the following objectives and consolidated the following skills:

- ✓ Awareness on the topic of circular economy and its " R's"
- ✓ Ability to propose concrete and relevant examples related to the concepts of "Reduce," "Reuse," and "Recycle"
- ✓ Ability to elaborate digital content by identifying an effettive message addressed to the target group
- ✓ Ability to produce effettive content aimed at raising public awareness on issues linked to the circular economy
- ✓ Basic editing and video editing skills
- ✓ Ability to work together applying numerous skills and knowledge to achieve common goals.

MODULE 4 - THE IMPACT OF CIRCULAR ECONOMY ON THE ENVIRONMENT

In this module, students adopt a circular economy model to minimize CO₂ emissions and be increasingly sustainable.

To be spokespersons for this message, students will become "green influencers," sustainability professionals who use social media to spread eco-habits and circular practices and propose "challenges". The goal is to involve friends and family members in reducing their environmental impact and become increasingly circular.

Step 1- Introduction to the activity

In this first phase, the activity is introduced by asking students to talk about their daily habits - and those of their family members - in the choice of groceries, clothes, means of transport used daily to go to school, out of town or on vacation.

Other questions may be:

'Are you used to buying from local stores or large retailers?'

'Do any of you have a vegetable garden?'. 'Do you buy clothes in large chains or are you used to wearing second-hand clothes?'

Students can compare their answers verbally or record them on a virtual whiteboard (Padlet) <https://it.padlet.com/> Students can then evaluate the list and decide which are the most sustainable and circular habits. Changing one's daily actions is difficult, but small changes lead to the decrease of CO₂ emissions and reduce man's harmful impact on the environment. But how do we stimulate ourselves and others to change bad habits? How can individuals adopt a more circular lifestyle? Sometimes, participating in simple and engaging challenges is all that's needed ! In this step students are asked if they know of or have recently participated in any fun and stimulating challenges where they learned how to do something useful.

Next, students are asked to imagine themselves as 'green' influencers. Sustainable habits and choices are disseminated through interactive online challenges for their followers in the hope that the new circular culture be adopted.

Step 2- Preparing for the activity

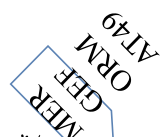
It is time to get into the thick of the activity!

The class will be divided into groups of four to six students. Depending on the students' skills and maturity, you can choose whether to give them more or less binding guidelines, for example by assigning them the scope of the challenge (e.g., Group A will have to devise a challenge related to mobility, Group B will have to devise a challenge related to food waste) or whether to leave them free to experiment and invent the challenge they prefer.

You can introduce this stage by showing the class some sustainable challenges such as the Eco-challenge.

To learn more

<https://www.ildolomiti.it/societa/2019/sfida-social-a-colpi-di-sostenibilita-arriva-la-eco-challenge-in-palio-una-bicicletta-casse-vaia-e-tanti-prodotti-biologici>



Which involved girls and boys from the provinces of Trento and Bolzano - or the GreenShower challenge

<https://www.ildolomiti.it/societa/2019/sfida-social-a-colpi-di-sostenibilita-arriva-la-eco-challenge-in-palio-una-bicicletta-casse-vaia-e-tanti-prodotti-biologici>

It is important to emphasize that the challenges given should not be overly difficult undertakings, but rather should be about simple actions that we do every day, like taking a shower!

https://www.ansa.it/ansa2030/notizie/bene_comune/2021/07/30/meno-acqua-sotto-la-doccia-arriva-green-shower-challenge_a0d5f488-d528-4e06-b07e-bd443834d06f.html

Step 3 - Creation of the challenge

This phase can be divided into two stages - challenge conception and implementation, which includes: the unfolding and documentation of the digital activity; the creation of a graphic cover to launch on social media; the choice of a hashtag, i.e., words preceded by the hash symbol (#) that summarise the topic and attract attention.

To learn more about hashtags and how they work, you can read this article.

https://www.mrw.it/social/hashtag_12862.html

Step 4 -It's time use your creativity!

Groups should come up with a challenge that is simple, fun and that encourages followers to adopt more circular and sustainable habits. For example: put all non-recyclable waste produced during the course of a week into a glass jar; create one or more creative clothing styles with using second-hand clothes; find ways to reuse water to wash fruits and vegetables.

Additionally, students are asked to think of the type of green influencer they want to impersonate and can create a sketch of him or her: what is his or her name? What area of sustainability does he or she deal with? What kind of audience is he targeting - student peers or a more mature audience? In which language and which International context, etc.)?

The challenges launched should be in line with the type of influencer he/she have and his or her followers. For example, if she is a green influencer who loves sports, hers can be a challenge that links sustainability and physical activity.

Step 5- Implementation phase

This phase of the activity can be assigned to students as homework.

Groups should come up with a hashtag for the challenge, test it and create a launch image to share (ideally) on social media. It can be decided whether it is the teacher who distributes the different tasks among the members of the groups or let the students decide who will do what.

Step 6 – Name the hashtag

The students or the individual student responsible for this step should think of a catchy title to give to the challenge in the form of a hashtag, which summarizes the goal and content in a simple and effective way. A high impact hashtag should be concise and easy to remember. To create an effective hashtag and inspire those trending on social media, students can use the TopTags app

(downloadable on iOS), which collects the most popular hashtags based on scope or In Tags (downloadable on Android), which also allows students to generate hashtags from a chosen topic.

Step 7 - Conducting the challenge

The students, the student-responsible for this step must carry out the challenge that the group created in order to check feasibility.

In addition, it is important that those who carry out the challenge document process and results, with photos and/or videos. The challenge should not be an extreme or dangerous activity, but something to be done easily and safely. The easier the chosen activity is, the higher the likelihood that the challenge will go "viral."

Step 8- Creating the graphic.

Students-or the individual student(s)-responsible for this step, will need to create graphics for a post to be published (ideally) on social media to present the challenge to the general public. To create an eye-catching graphic, students can use Canva software.

The graphic should contain the challenge hashtag and a few concise pieces of information about its goals. Shots or videos of its progress could also be included.

Step 9-Return and evaluation

In this phase, groups explain to the rest of the class what kind of green influencer they have decided to impersonate, show the graphic they created, and narrate the challenge they thought of, explaining the meaning of the chosen hashtag, the methods and objectives of the challenge, and sharing with the class their results in the unfolding phase.

After listening to all groups' exposition, invite students to reflect on the content produced: was it fun to create the challenge? And carrying it out? Do you think it can go viral? Do you think such activities can have a positive impact on the environment? You can guide the class's thinking and evaluate what was learned, using the questions suggested below:

Does the challenge designed urge participants to adopt a more sustainable lifestyle?

- Is the proposed challenge fun and appropriate for its intended audience?
- Is participating in the challenge easy and safe?
- Is the chosen hashtag catchy and consistent with the scope and content of the challenge?
- Do the graphics created attract attention? Is it well done and consistent with the theme of the challenge?
- Were the students able to carry out the challenge safely, achieving the intended goal?
- Which of the challenges you just saw would you like to participate in?

At the end of the activity, you could choose together with the students a challenge to propose to other classes or even to the whole school by posting it on the institution's website.

Choosing a circular economy model that involves reducing, reusing and recycling waste can save the climate by reducing CO₂ emissions into the atmosphere.

At the end of the activity, students will have achieved the following objectives and consolidated the skills listed here:

- ✓ Knowledge of the phenomena of climate change and global warming
- ✓ Awareness of the impact of the circular economy on CO₂ emissions and climate change
- ✓ Production of effective, immediate and engaging digital content aimed at spreading sustainable and circular habits
- ✓ Ability to convey an educational message through digital content
- ✓ Awareness of the virtuous opportunities of social media
- ✓ Ability to work together with peers, collaborating and harnessing heterogeneous skills and knowledge to achieve a common goal.

MODULE 5- THE "GREENWASHING": FALSE FRIENDS OF THE CIRCULAR ECONOMY.

In this module, students will learn how to recognize the phenomenon of greenwashing, its strategies, and how to distinguish it from the true circular economy. Finally, they will make an interactive digital map to help consumers be more aware and make truly sustainable purchases. Were the students already familiar with the term "greenwashing"? Did it ever occur to them-or to their families-that they thought a product was more sustainable and environmentally friendly just because it had a green label or with illustrations that recall nature? Have they ever been fooled by an "owl ingredient" or a vague term?

Step 1- Introduce the activity

Introduce the activity by asking your students if they have noticed that it is increasingly common to find products advertised as sustainable, "green," and "eco-friendly" in the marketplace: how often do they read the words "organic," "eco," "natural," or "sustainable" when they are shopping or wandering around stores? But how to tell if this sustainability is genuine or just window dressing? Amidst so many misleading labels, it is difficult to make truly sustainable choices, but that is not to be discouraged! On the contrary, it is crucial to learn to recognize the signs of greenwashing in order to become conscious consumers and not be fooled.

Step 2 - Explanation of the activity

Now it is time to present the activity to the class. Students will make an interactive digital map of a store, supermarket, or shopping mall to help consumers navigate their shopping, consciously choose truly environmentally friendly products and brands, and recognize those signs to pay attention to in order to unmask "false friends" who only want to appear sustainable.

Step 3 - Preparing for the activity

After the explanation, it's time to get into the thick of the activity!

You can divide the class into small groups of two or three students or have them do the activity individually. At this point, you can choose whether to assign each group-or each student-a specific place to make the map of (a supermarket, a clothing store, a shopping mall, a market) or to give students complete freedom by reminding them that they will have to choose a place where consumer goods are purchased.

Step 4-Design and implementation of the map

This phase can be divided into two stages: designing and making the interactive map. The former we recommend that you have it done in class, to be available to students in case any doubts or requests for advice arise. The implementation, on the other hand, can be carried out outside of class hours as homework.

Design moment

At this stage, the students decide what information they want to give consumers with their map to help them recognize greenwashing. For example, if the group wanted to make an interactive map of a supermarket, it could identify the "cosmetics and household products" department as a potential source of greenwashing. In this case, it could urge consumers to pay attention not only to the product packaging (which could indeed be made from recycled materials), but also to the ingredients they contain, because some could be harmful to the environment. Similarly, in the grocery department, the map might suggest that brands that offer a line of organic products but also sell numerous non-sustainable products are not really considered sustainable.

Moment of realization

This phase of the activity can be assigned to students as homework. First, groups will have to choose the images they will include in their map: they can take photographs of the chosen places and products or search for images on the Internet. Students can use free images of stores, supermarkets, products or consumer goods by downloading them from websites that collect copyright-free images, such as Pixabay, Unsplash or Pexels. If students decide to use photos taken by them, it is important that no people, product brands or stores are recognizable in the chosen images. Better instead to focus on label elements, such as descriptions, ingredients, or certification labels. After the selection of images, it is time to make the interactive digital map. At this stage, we suggest having students use the Genially software with which you can easily create interactive images. Should the creation of an interactive map on Genially prove difficult, you can create with your students a small dissemination exhibit for the common areas of the school or posters to hang in the classroom with insights, through the use of QRcodes-which you can create with the QR Code Generator site, at this link-or pop-up figures.

Step 5 - Return and Evaluation

In this phase, groups-or individual students-exchange the maps they have made and explore them with each other, paying attention to the concepts related to greenwashing that are addressed and explored in the map being considered. After seeing all the content, initiate a time of collective reflection on the work done. You can guide the class's reasoning in evaluating what they have learned using the questions suggested below:

- Is the information contained in the map you created correct?
- Is the information contained inherent to greenwashing and sustainable consumption?

- Is the map created a useful tool to help consumers avoid greenwashing and purchase truly sustainable products?
- Is the information selected for the map from reliable sources?
- Is the map clear and intuitive to navigate?
- After looking at one or more maps made by another group/student, would you change anything about yours?

At the end of the activity you could show the content you made to other classes or upload it to the institute's website so that it is available to everyone.

We also invite you to select the best interactive map and share it on social media

At the end of the activity, students will have achieved the following objectives and consolidated the skills listed here:

- ✓ Awareness about the dangers of greenwashing and the importance of recognizing this phenomenon in order to become aware consumers
- ✓ Ability to recognize the main greenwashing strategies deployed by entities operating in the consumer market (such as companies or advertising agencies)
- ✓ Ability to create interactive digital content
- ✓ Ability to create informative and effective content aimed at raising awareness of greenwashing and sustainable consumption issues.

Module 6 - CIRCULAR IS POSSIBLE: STORIES OF CIRCULAR ECONOMY

Being sustainable and adopting a circular consumption model is not always easy: there are so many daily actions that have an impact on the environment and that we need to rethink in a more sustainable way. The fact that it is not always easy, however, does not mean that it is impossible; on the contrary, more and more Italian realities are adopting good sustainability practices and favoring the transition to a circular economy model. It is important to give these realities a voice and spread their stories of circularity, to motivate and inspire as many people as possible. In this activity, your students will need to devise and record a podcast episode that tells a virtuous example of a circular economy.

Step 1 - Introduction to the activity

In this first step, introduce the activity by asking your students if, during this journey, they have paid attention to the presence of circular realities near them that enable reuse, recycling, or material reduction, such as bulk stores or water houses. Have they discovered any realities, or perhaps any initiatives that they would like to participate in and share with the class? Collect students' thoughts on the blackboard and add your own.

Step 2 - Explanation of the activity

Reflect together on the importance of disseminating sustainability stories precisely to show that -contrary to commonplaces- a circular future is possible and achievable. Then ask students what format they would use to tell stories about the circular economy: a column in the school newspaper? A television broadcast? A YouTube channel? Collect students' ideas on the whiteboard. Once this brainstorming moment is over, tell the class that this time the activity to be

done will be to devise and record a short episode of a class podcast, where they will tell an example of a circular and sustainable economy

Step 3 - Preparing for the activity

It's time to get into the thick of the activity! Divide the class into groups of four to six students so that everyone can actively participate in creating the podcast episodes.

Depending on the skills and maturity of the class, you can choose whether you assign the groups the example of sustainability to be told or the scope of the research (e.g., Group A should tell about a bulk goods store in their municipality; Group B will talk about an example of sustainable mobility, etc...) or whether you leave complete freedom to the students.

Step 4 - Conception and implementation of the podcast

This step can be divided into two stages: the conception and implementation of the podcast episode. The former we recommend that you have it carried out in class, to be available to students in case any doubts or requests for advice arise. The realization, on the other hand, can be done outside of class hours as homework.

Moment of devising the podcast and researching materials

At this stage, groups should choose the circular economy reality they will discuss in their episode, if it has not been assigned by you, and search for information about it.

During the research, students can discover zero waste realities present (such as water houses, bulk goods stores, reusable goods stores, used clothing stores...); circular start-ups or even to find out about all the virtuous and sustainable initiatives in their area.

Pupils are free to talk about a circular initiative that they already know about or have perhaps participated in firsthand (e.g., a second-hand clothes store in their neighborhood, a sharing mobility or pedibus system active in their municipality, a playground or picnic area made from recycled materials in their neighborhood). To gather the information needed to record the episode, students can help themselves with the following guiding questions:

- When and where was this reality/initiative born? To whom is it directed? What community needs does it address?
- Why is this reality/initiative circular and environmentally sustainable?
- How widespread and well-known is this reality/initiative? (For example, if it is an initiative: has it been implemented for several consecutive years? Will it be renewed?)
- If it is a store: is it known in the area? Have you ever shopped there or would you shop there?
- If it is a business: have you heard about it on television, radio, or social media)?
- Has this reality/initiative received any awards or recognition?
- Why do you like this reality/initiative? What is its strength?

Moment of making the podcast

At this point, the activity can be assigned to students as homework. Groups will be asked to write the outline of the episode, come up with a title, create a graphic for the cover, and record the audio. Tasks are distributed among group members or students decide for themselves who will do what. Students responsible for this activity write the outline of the episode and organise the information to be shared with listeners. If the teacher prefers, and depending on the skills and/or needs of the class, you may ask students to write the text of the entire episode, an actual script, to be read and acted out during a recording. The teacher will also point out that the length of the episode must be two to five minutes long. Lastly, students choose the title of the episode.

Creating the cover page

Students responsible for this step will need to create the cover graphic. To create eye-catching graphics, groups can use Prezi software. A quick strategic tip; the graphic should contain the title of the podcast and the title of the episode.

Recording the podcast

The students responsible for this activity will be in charge of recording the podcast. They may choose to have everyone speak, dividing up the topics to be covered given in the outline, or have only one speaker speak and assign another person involved in this phase to manage the recording, starting it and stopping it in case of mistakes or external noise. To record the episode, it is sufficient to use the microphone of a smartphone, but it is also possible-for students who are more experienced-to make use of audio editing programs for smartphones, such as GarageBand (available for iOS) and MP3 Cutter & Merger (available for Android).

Step 5 - Return and evaluation

Once you have made all the episodes and their respective covers, you can create a shared online folder where you can put all the material, or share them via email with the class so that everyone can see and listen to them at home. Then, in class, students can choose the title of the class podcast together and initiate a time of collective reflection on the work done.

You can guide students' reasoning in evaluating what they have learned by using the questions suggested below:

- Is the information in the podcast correct?
- Is the information in the podcast presented in a clear, coherent, and engaging manner? Is the tone of voice of the speakers confident, well paced, and engaging?
- Do the realities that the groups have chosen to examine contribute to demonstrating that a circular future is possible?
- Is the title catchy and consistent with the content?
- Are the cover graphics well done and in line with the theme of the podcast?
- Would you have your friends and family listen to the podcast?
- After having listened and viewed the content made by other groups would you change anything in your episode?



At the end of the activity, you can also share created podcasts with other classes in the institution or upload them on the school website or online page of the school journal.

https://www.spreaker.com/show/storie-circolari_1

At the end of the activity, students will have achieved the following objectives and consolidated the following skills:

- ✓ Knowledge of many examples of circular economy;
- ✓ Ability to research topics using reliable sources and materials;
- ✓ Ability to organize and elaborate information and arguments within a set time frame;
- ✓ Produce clear, effective and engaging digital content;
- ✓ Ability to tell a story that is educational and inspiring to the audience through digital content;
- ✓ Basic audio editing skills;
- ✓ Ability to work together with peers, collaborating and harnessing disparate skills and knowledge to achieve a common goal.

Module 7- MAKING E-CODING EXERCISES

Activity 1

Let's start with coding !

Introduction to CODING and first experimentation in Code.org

<https://code.org/>

Activity 2 Coding let's play !

Knowledge and experimentation in Scratch field

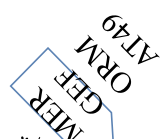
<https://scratch.mit.edu/ideas>

Activity 3

Let's make coding!

Building games with Scratch

Examples of exercises

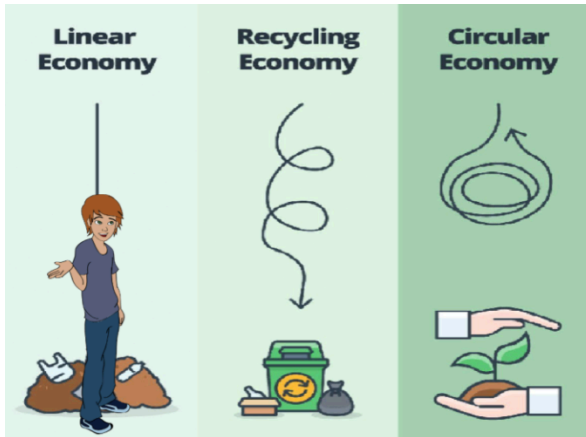




Funded by
the European Union

FITDigit

2022-1-FR01-KA220-EDU-000034740J



<https://scratch.mit.edu/projects/956713246>

Who is the most famous sailor protagonist of the circular economy?

- A Ellen MacArthur
- B Paul Cambell-James
- C Tiziano Nava
- D Bob Dilan

<https://scratch.mit.edu/projects/956855384>



<https://scratch.mit.edu/projects/949646734>

MER
GEE
ORM
AT49

At the end of the activity the students will achieve the following objectives and consolidate the skills reported here:

- Develop computational thinking
- Find your way around simple programming strings
- Collaborate with peers in problem solving
- Learn technical-specialist languages
- Acquire skills in coding and decoding information messages
- Know-how to critically review one's work
- Knowing how to find, among the solutions to the same problem, the optimal one (fewest operations)
- Know-how to reuse procedures and methods in different contexts
- Experiment with the practice of learning to learn.

INDEX

Introduction.....	2
First section	
Module 1 Environmental education and sustainability challenges.....	3
Module 2 Linear and circular economy.....	10
Module 3 The Rs' of sustainability.....	13
Module 4 The impact of circular economy on the environment.....	15
Module 5 Greenwashing: the false friend of the circular economy.....	18
Module 6 Circulariity is possible: successful stories of business.....	20
Module 7 Making e-coding exercices	28
Second section: in the classroom	
Module 1 Environmental education and sustainability challenges.....	30
Module 2 Linear and circular economy.....	35
Module 3 The Rs' of sustainability.....	37
Module 4 The impact of circular economy on the environment.....	39
Module 5 Greenwashing: the false friend of the circular economy.....	42
Module 6 Circulariity is possible: successful stories of business.....	44
Module 7 Making e-coding exercices.....	47