Long Teaching Sequence
For students aged 15 to 17

How can we transform waste into new products in our communities?

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movimento circular

TECHNICAL INFORMATION

Topic The lifecycle of products created from the residues generated in our communities.

Summary In this Teaching Sequence, students will be challenged to come up with ideas to transform the residues generated by their communities into new products. To do so, students should work in groups to design a series of steps: from collection, to production and sales. At the end of the activity, students should *pitch* their products to hypothetical investors.

Suggested audience Students aged 15 to 17.

Estimated Duration Six lessons.

Subjects involved Geography, Sociology and Languages.

Materials 6 computes with internet access (minimum one computer with a projector), kraft paper, rulers, scissors, and markers.

Learning objectives

Concepts: Circular economies, entrepreneurship, waste, reuse

Steps: Individual and group research; data collection and analysis; information organization; idea selection; opportunity identification.

Reinforced behavior: Group work, respect to different points of view, empathy, awareness on the importance of social and environmental opportunities

Keywords: Residues, waste, resources, products, business, innovation, *pitch*.

Related SDGs

SUMMARIZED STEPS

1. Explore

To inspire students, teachers should show them a video about the "precious plastic" project showing different business opportunities that emerge from the reuse of plastic waste. After students have been properly engaged, present them with the main challenge in this Teaching Sequence: **How can we transform waste into new products in our communities?** Students should be put into groups and choose one type of waste often seen in their communities.

2. Research

At home, groups should look for initiatives that have created products from the same type of waste they chose in class. Later, at school, the group can sit back together and choose product they want to develop. Back at home, each group member should deep dive into one of the stages of this product's lifecycle: collection, waste sorting, processing and transformation, product design and manufacturing, distribution and sales, and maintenance and reuse.

3. Solve

To provide a solution to this challenge, each group should come up with a business idea that transforms their type of waste into the product of their choice. They should find inspiration in the research they conduct at home to design each stage of their product's lifecycle.

4. Share

In the last lesson of this sequence, groups should determine how to pitch their products to the class (brief oral presentation to show their idea and advocate for their project). Finally, an event should be held, to which other members of the school community will be invited to see students pitch their projects.

STEP BY STEP

Intro

The future of work is uncertain. We cannot predict what work will be like in the future or what professions will exist. Although we see some current trends, the job market is very dynamic and is changing faster than ever.

Experts say that many of the professions we know will soon disappear and give way to new ones that are yet unconceivable. As an example, the emergence of internet, as well as of information and communication technologies, cleared the way for hundreds of new jobs in programming and design.

We must prepare the young for the future, taking into consideration both the opportunities available to them today, as well as those that are yet to emerge. Therefore, it is paramount for students to have flexible skills and to learn how to learn.

There is a myriad of opportunities to be seized in the world of circular solutions. Young people could take part in this new perspective for the future.

Recommendations:

Introductory activity on Circular Economies

Before using this Teaching Sequence with participants, we recommend first conducting the intro activity on Circular Economies with them. This is an important step to introduce the main concepts needed for this discussion.

1. Explore

LESSON 1

Finding inspiration | 15 minutes

Start the lesson by telling students that they will take part in a series of activities for the next few lessons and, throughout these lessons, they will have to overcome a challenge.

Next, show them the video on the "precious plastic" project to inspire them (don't forget to turn on subtitles if needed):

- Precious Plastic Universe: a big bang for plastic recycling. (2:00 minutes)

link: encurtador.com.br/isBGP

Recommendations: Closed captions are available in Portuguese. Click the icon at the bottom of the video to activate subtitles and, next, go to "details" and choose: "Subtitles/CC", "Auto-translate" and "Portuguese".

When the video is over, ask students whether businesses like that could emerge in their community and let them speak freely.

Could a business like this emerge in our community?

Recommendations: If appropriate, create a collaborative document with the main ideas shared by the class. You may use this document at the end of the Teaching Sequence to compare students' initial ideas with their opinions at the end of this process.

Introducing the challenge | 5 minutes

Next, tell students they will work in groups to look for answers for a common question:

How can we transform waste into new products in our community?

Tell them that each group will have to choose one type of waste that is commonly generated in their community and they should come up with a business idea to reuse this raw material and create a new product. They should devise a collaborative network able to transform waste into products, similarly to what they saw in the "precious plastic" video.

They should think about the full lifecycle of their product: from how to collect the waste, design the product, manufacture it, sell it, provide maintenance and, finally, recollect disposed products to transform them back into raw material. The ultimate goal is to create a circular process through which students can reuse materials to prevent them from reaching landfills. Therefore, their new products should also be able to rejoin the circle at end of life.

Recommendations: It should be clear to students that they should not just find a new purpose to a used item. For example, turning PET bottles into vases or making crafts from aluminum scraps is not an option. Waste should be processes and turned into something new and useful.

Organizing the groups | 25 minutes

Split students into groups of five. Ask groups to choose a type of residue that is abundantly seen in their community. They may choose home, institutional, industrial, or even school-generated waste. Give students some time to talk, and then write on the board what type of waste was chosen by each group. If students are not aware of the most common types of waste to choose from, we recommend teachers to arrange a field trip to teach them more about how waste is disposed of in their community.

Instructions for the research | 5 minutes

At the end of the lesson, tell groups to search for more information on the type of waste they chose.

2. Research

AT HOME

Find products that are made of this material.

Each group should search for more information on the type of waste of their choice. Students should be organized in small groups.

They should look for products that have been developed using that material. Tell students to find as much information as possible: how the product was first devised, how it is manufactured, what it is used for and who buys it.

Tell them they will present their findings to the rest of the class in the following lesson.

LESSON 2

Sharing their findings | 20 minutes

Start the lesson by asking students to form a large circle where students from the same group should sit next to each other. Next, ask each group to present their findings. Allocate time according to the number of groups, so that all groups have a chance to talk.

Choosing the product | 25 minutes

After the presentation, groups should get together and decide on the product they would like to develop. The teacher should walk around the class to see whether groups need help and whether the products they have chosen meet the criteria for this project.

Instructions for the second research | 5 minutes

At home, each group should investigate the different steps that make up the lifecycle of the product they have chosen. Make sure that students understand that this step is critical if they want to develop a product that responds to the challenge given to them. Tell students that they can use the internet or talk to people who can provide them with the information they need for their project. They should write down everything they learn either on their notebooks or in online documents.

Allow time at the end of the lesson for students to talk to their groups and organize their research. Remind them that their research must be ready by next class.

AT HOME

Lifecycle investigation

When looking for information, each group should try to find initiatives related to all five steps of their product lifecycle. The innovative solutions, latest technologies, and recent scientific breakthrough they find should serve as the basis to develop their product. Tell groups that each member of the group should be assigned one of the five stages of the lifecycle.

Here are some tips to guide students in their research:

Step 1: waste collection and sorting.

Efficient ways to organize waste collection; containers where the material will be stored; transportation options; efficient waste sorting, if needed; how to organize the sorted material; how to organize the space where the raw material will be stored.

Step 2: waste processing and transformation.

Existing equipment and tools to process this material, processing techniques, materials that result from the waste transformation, possible use for the resulting material.

Step 3: product design and manufacturing.

Types of products that are made of this material; possible uses for the manufactured product; projects that allow the product to be reused as raw material after disposal; product design.

Step 4: distribution and sales.

Product transportation to point of sales, places where the product will be sold, ideas for how to display the products (in brick-and-mortar or online stores), services that may be provided in association with that product, product advertisement.

Step 5: material maintenance and reuse.

How to reuse this product after disposal. How to reuse different parts of the product. How the waste it generates may be reused.

3. Solve

LESSON 3

Sharing and organizing ideas | 25 minutes

Back to class, each member of the group should tell their colleagues, in summary, what he/she learned from the research. Each group should choose one person to take notes and write down the main topics shared by each member — this will be done in subsequent steps as well. When it is time for this person to speak, someone else should take notes in his/her place. Therefore, after all five group members have talked, the group will have all main topics recorded on paper.

Recommendations: Tell the students taking notes that they should not write down everything that is being sad, but rather to organize just the core ideas shared by each member.

Business ideas | 25 minutes

Now that groups have a good grasp of all the steps that make up this process, they should now come up with concrete ideas to set up their

business. To do so, groups should consider the best ideas that emerged in their research and that could contribute to the business they are starting.

Groups should organize their ideas considering all the five steps of their product lifecycle, as seen in the table below.

Step	Best ideas for our business
Step 1: waste collection and sorting.	
Step 2: waste processing and transformation.	
Step 3: product design and manufacturing.	
Step 4: distribution and sales.	
Step 5: material maintenance and reuse.	

Groups should also take other factors into consideration: the place of work, people involved, other materials they will need, means of transportation, tools and equipment, infrastructure and everything else required to run their business. There is no need to calculate whether their project would be economically viable, however the business model should be as detailed as possible.

Recommendations: Walk around the classroom, talking to all the groups to help them advance their ideas, check whether they have questions, and suggest new ideas if needed. Analyze each individual group to see whether to recommend additional research to help them develop their ideas before the following class.

Assessment

Make sure all groups are on the right path by observing their discussions closely, reading the notes they take and checking which websites were used to fundament their ideas.

4. Share

LESSON 4

This class will be used to prepare students to present their ideas to the school community. Students should pretend their audience is a group of investor that might be interested in sponsoring their projects. To convince investors, each group should prepare a short but compelling pitch.

How to pitch your product | 10 minutes

Tell students that they will now have to pitch their products to the school community. Explain to them what a pitch is:

A 3 to 10-minute-long presentation that aims to arouse interest (usually of investors or customers) for your business. Only critical information or unique details of the project should be included. The pitch will be done orally, but groups may choose to use a few slides summarizing the main topics of their presentation (3 to 5 slides).

References:

https://endeavor.org.br/dinheiro/como-elaborar-um-pitch-quase-perfeito/

https://www.anjosdobrasil.net/pitch.html

Next, tell students their pitch should include answers to the following questions:

1. **WHY?** Why is this project important? (What are the social and economic opportunities for your community? What are the

social and environmental opportunities for your community and the planet?)

2. **WHAT?** What is the solution you are putting forward? How did the group arrive at this solution?

3. **HOW?** How does it work? What are the solutions provided for each step?

Slide preparation on kraft paper | 40 minutes

The groups start working on their presentation. They should organize the ideas to be included on the slides.

Each group should use large sheets of kraft paper as a temporary surrogate for the slides. They should be able to summarize the core ideas of their projects.

Slide organization:

1. **WHY?** The first slide should introduce their product and explain why this project is important by presenting the social, economic and environmental opportunities it seizes.

2. **WHAT?** The second slide should bring an organizational chart showing one step leading to the next through arrows, summarizing the product's lifecycle.

3. **HOW?** The third slide should explain how the project works, with an emphasis on the main solutions provided for each step.

Each group should choose one person to present the slides to the audience.

Recommendations: At the end of the lesson, the members in charge of taking notes within each group (or the teacher) should take pictures of the slides drawn on kraft paper to be able to recreate them later on a computer.

AT HOME

Each group should use the pictures of the kraft paper sketches to recreate the slides on the computer. Remind students to include an opening slide with the title and a closing slide thanking the audience.

Give them the option to rehearse their presentation in the following lesson. Tell them the pitch should be compelling and well-rehearsed, that is why it is important for them to first try it out with their classmates and see what can be adjusted to improve their performance before presenting to the rest of the school community.

Allocate time in a way that all groups have the same amount of time and tell them how much time each group will have. If you have 25 minutes total, for example, and you have 5 groups in your class, each group should have 5 minutes to present their pitch.

LESSON 5

Presenting their pitch to classmates | 40 minutes

Ask the students to arrange the chairs in front of the classroom to emulate an audience. Next, each group presents their pitch in turn. Time their presentation and let students know when they are running out of time.

At the end of each pitch, ask the audience to ask questions, make comments and make suggestions on how to improve the pitch. Make sure all groups have followed the pitch structure proposed in the previous class and, if needed, give instructions on how to adjust their presentations to become more like a pitch.

Adjustments | 10 minutes

Before the lesson is over, tell students to get back together and adjust their presentations according to their classmates' suggestions.

AT HOME

Students may use the time they have before the next class to refine their presentation and rehearse a second time.

The teacher must recruit three people from the school community to play the role of the investors during the students' presentation. These roles may be played by teachers, school counselors, parents, and even other students.

LESSON 6

Set up

Before the lesson starts, ask students to organize the room where the pitches will be presented to create a pleasant and friendly environment for the audience. Three chairs should be set apart in the front row for the make-believe investors. A computer and projector should also be set up and tested before the lesson starts to make sure everything is working properly.

Presenting the pitches | 35 minutes

Before students present their pitches, explain the project to the audience: tell them about the challenge, the journey to find new solutions and its results. Tell them that the students will now pitch their products to them and explain what a pitch is so that everyone is on the same page.

Next, groups present their pitches in turn.

Comments and impressions from the audience | 15 minutes

At the end of the presentations, the people playing the role of the investors should comment on the products proposed by each group, pointing out their strengths and weaknesses. Then they should say in which projects they would invest their money and why.

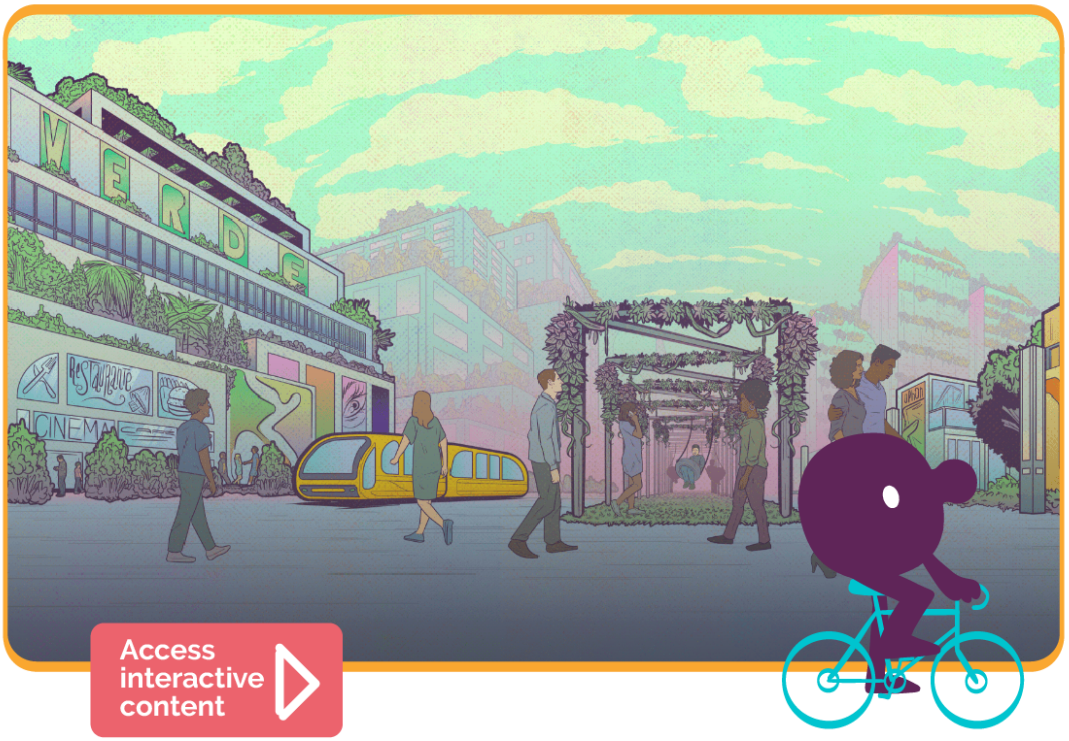
Wrap-up

Finally, the teacher thanks the audience, congratulates the students, and offers a round of applause to everyone who contributed to this project.

Assessment

All the steps in this Teaching Sequence can be used to assess the students, for example:

1. Assess how students conducted their research in the "explore" and "research" steps.
2. Assess the ideas put forward during the "solve" step.
3. Assess how students used critical thinking and argumentative skills when sharing their ideas.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CINEMA
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REFERENCES

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https://www.youtube.com/watch?v=OWxy4PXq2pY

Meet the people rethinking ownership

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

Global Footprint Network calculates mankind's Ecological Footprint

https://www.youtube.com/watch?v=SD4zArzv96s

Meet the people rethinking ownership

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

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https://www.ellenmacarthurfoundation.org/

The Circular Design Guide

https://www.circulardesignguide.com/

New Plastics Economy - The Future Of Plastics - New Plastics Economy

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Ideia Circular - Circular Design and Economy in Brazil

https://www.ideiacircular.com/

A Big Bang for Plastic Recycling

https://preciousplastic.com/

Texts and documents:

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