STEM E-CONTENT 3D VIRTUAL REALTY

The Key To Global Life,
Digital Change Of Nature

Total Duration: 2-4 hours (40 min to choose the products + time to research at home + time for fabrication activity) + 40 min final feed back & presentation.

Student's Age: 14-18 Years

Application Area:
- Emissions
- Costs
- Efficiency

Keywords: Cost effectiveness, Materials transportation, Carbon footprint, Greenhouse Effect.

G3 - Carbonfootprint Tshirt Logo

Module
- Environmental pollution
- Global Warming

Materials:
- White unprinted t-shirt
- A4 Paper (for pre-design)
- Colored crayons
- 2D vector drawing software (inkscape)
- Transfer Printing Paper
- Plotter cutter or laser cutter & related goods (e.g. flex, flock, infusible ink, wood, cardboard)
- Heat press (Hot printing machine)
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G3 - English Version

Notes:
- Take safety precautions when using the electronic devices;
- Read carefully the instructions for the heat press, take precautions against burning;
- Maximum of two students per PC during the activity;
- Adopt the DIY learning approach

@digitalchangeon

Summary

Students work in teams and choose three products used in daily life from each of these categories:
- food or drink;
- clothes;
- recreation.

They make a report about the materials the products are made with, the place where these materials are obtained and the journey that these materials make to arrive at the factories.

Then they must choose one of these products that can be manufactured closer to home and compare the difference in costs in terms of energy, human resources, etc.

Finally, they will create prints for merchandising to raise the public's awareness about the concept of carbon footprint and the advantages of local production in terms of benefits for climate change.

Introduction

The main objective of this activity is to evaluate the carbon emissions, human labor and energetic cost of a product's journey from raw material to consumer. At the end of the research step, students should recognize the impact of domestic consumption on sustainability indicators. The results of this first step will be converted into products such as posters, slogans, logos, to be used by students in public awareness activities. For instance, students can design a banner, a slogan, a logo to attract people's attention regarding climate change, global warming, carbon emissions, energy use, recycling, etc (Picture 1). These products are used for t-shirt printing (retail). This activity also contributes to increasing students' entrepreneurship skills.

Picture 1. Imagine a banner

In this activity the teacher shows examples of products (as canned pears) that comes from far away and has to travel a long distance:
https://www.foodrenegade.com/how-far-does-your-food-travel/
but that can also be produced locally:
https://schoolnutrition.org/uploadedFiles/2_Meetings_and_Events/SN_Magazine/Pages/Bonus_Web_Content/BWC_2019/Journey-of-a-Canned-Pear-Infographic.pdf
The teacher then asks students to choose one of these products (food, drink, clothes, recreation) and to do some research about its chain production, such as, which materials it's made of and where they came from; distance and costs of the material's journey from its origin to the factory, shipping costs, energy involved, human resources … Also, students should choose one of the products that can be manufactured closer to home to compare total costs of both scenarios.

At this point, the carbon footprint concept is presented and discussed with the students and their participation is encouraged. Results are shared and students are asked to write a storyline to the public's awareness and think of a sketch, a slogan, or a logo for the main message (carbon emissions, promoting local production, etc). Finally, they use this slogan or logo to design a print for a new collection of t-shirts.

By the end of the activity the students will not only have increased their level of awareness about carbon emissions contributions, energy use, recycling, but also have designed their own t-shirt.

Considerations

- Take safety precautions when using the electronic devices;
- Read carefully the instructions for the heat press, take precautions against burning;
- Maximum of two students per PC during the activity;
- Adopt the DIY learning approach

Aims of the activity

- Raising awareness about the real cost of daily products, in terms of energy and human resources;
- Teaching to reflect on the possible impact of merchandising as a tool to create awareness,
- Understanding the importance of reporting in scientific research,
- Developing entrepreneurial skills.

Activity Process

Before Activity

Picture 2. Chose the groups

- Students are grouped in pairs based on selected products.
- Distribute tasks within each group: 1 student calculates transportation costs, other students calculate carbon emissions, …
- Prepare on PC the related links for research.
- The Inkscape program is installed on PCs.
- T-Shirts are available for printing.
- The printer, paper and hot press are available for transfer printing.

Let's Start

1 **Research and material choice:**

1. Teacher shows an example of a product (e.g. canned pear) that comes from far away and has to travel a long distance (Picture 2). They discuss this product.

2. Students choose one of the three products shown by the teacher.

3. Students divide into groups according to the selected products.
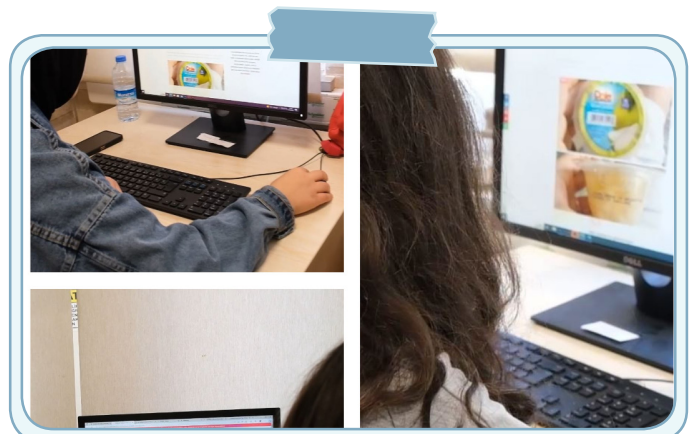
Picture 3. Example of the products

4. One of the students in the group calculates the cost of container (transportation) of the selected product. The calculation uses the webpage that allows you to calculate the transport costs of merchandise (e.g. https://www.freightos.com/ - choose a free website that does not require you to fill in any personal details). Introduce where the product comes from, enter the information where the product is going to and click the button "Get Quotes". The directions are taken into account.


Picture 4. Carbon emissions

5. The other student reads the article (Magnani, E. (2011). Environmental protection, inequality, and institutional change. Annals of the New York Academy of Sciences, 1219(1), 197-208.), reporting how carbon emissions (pollution) are caused by shipping containers and load trucks (Picture 4).

2 Create a banner.

1. Create a banner, slogan, logo on paper, etc. to create awareness with their design. Use Inkscape (https://inkscape.org/) to make the designs digitally (Picture 5).
2. Transfer the drawing on paper to digital media using the program menus.
3. Print the designs on the Transfer print sheet (Picture 6)
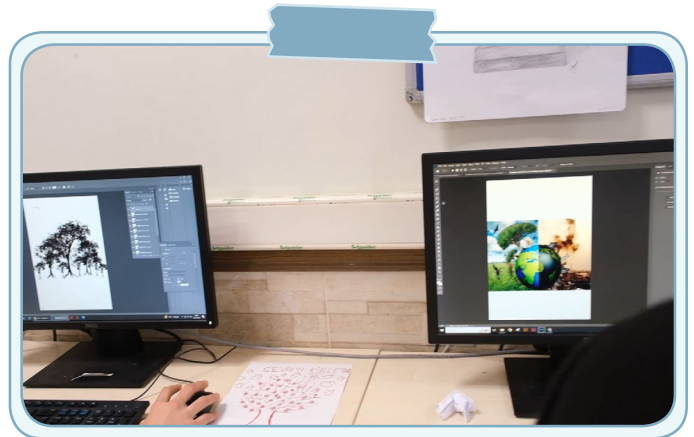
Picture 5. Create a banner

Picture 6. Print the designs

4. The T-shirt is laid out properly on the press machine. The logo/image is placed in contact with the t-shirt. Wait to heat the printer. When the required temperature is reached, the logo/image is pressed on the T-shirt for 30s. After another 30s the print is removed and the t-shirt is ready for use. (Picture 7).

Picture 7. Print the designs

Closure

- Ask them to design labels after the infographic stage. At the end of the activity, students will get a printed t-shirt (Picture 8).

Picture 8. **Examples**

Assesment

Evaluation

- This activity is expected to improve students' ability to conduct group work and follow scientific research steps. Students will work in groups to design a logo, a banner, a slogan, etc.

Goals	Must be Improved (1)	Medium (2)	Good (3)	Very Good (4)
Express yourself	(.....)	(.....)	(.....)	(.....)
Participate in discussions	(.....)	(.....)	(.....)	(.....)
Originality of designing	(.....)	(.....)	(.....)	(.....)
The Relation of the developed design to the subject	(.....)	(.....)	(.....)	(.....)
Harmony with internal group work	(.....)	(.....)	(.....)	(.....)
Ability of using Digitally	(.....)	(.....)	(.....)	(.....)
Using Scientific Process	(.....)	(.....)	(.....)	(.....)
Effectiveness of the presentation	(.....)	(.....)	(.....)	(.....)
Total				

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- **Background info for Teachers**
- *Cost to send things by container*
Container shipping rates | What are the costs in 2022? | MoveHub
- *Emissions*
Here´s how much pollution shipping containers and freight trucks cause
- *How much pollution to ship in a container*
https://en.wikipedia.org/wiki/environmental effects of shipping
- *A little chart of emissions*
UK: carbon footprint of cargo ships by type 2021 | Statista

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Links

(Freepik Company) Foodrenegade. (2022). HOW FAR DOES YOUR FOOD TRAVEL? Retrieved 22.09.2022 from https://www.foodrenegade.com/how-far-does-your-food-travel/

Freepik Company, S. L. Images. Retrieved 12.09.2022 from https://www.freepik.com/

MoveHub. (2022). https://www.movehub.com/uk/

Statista.(2022)   https://www.statista.com/statistics/1233482/carbon-footprint-of-cargo-ships-by-type-uk/

https://www.eticaeconomia.it/ee/wp-content/uploads/2018/05/Schermata-05-2458254-alle-09.43.27.png

https://www.ispionline.it/it/pubblicazione/catene-del-valore-la-sfida-i-paesi-di-sviluppo-28622

https://scholar.google.com.au/citations?view_op=view_citation&hl=en&user=H4yE_IYAAAAJ&cstart=20&pagesize=80&citation_for_view=H4yE_IYAAAAJ:4TOpqqG69KYC

https://en.m.wikipedia.org/wiki/Global_value_chain