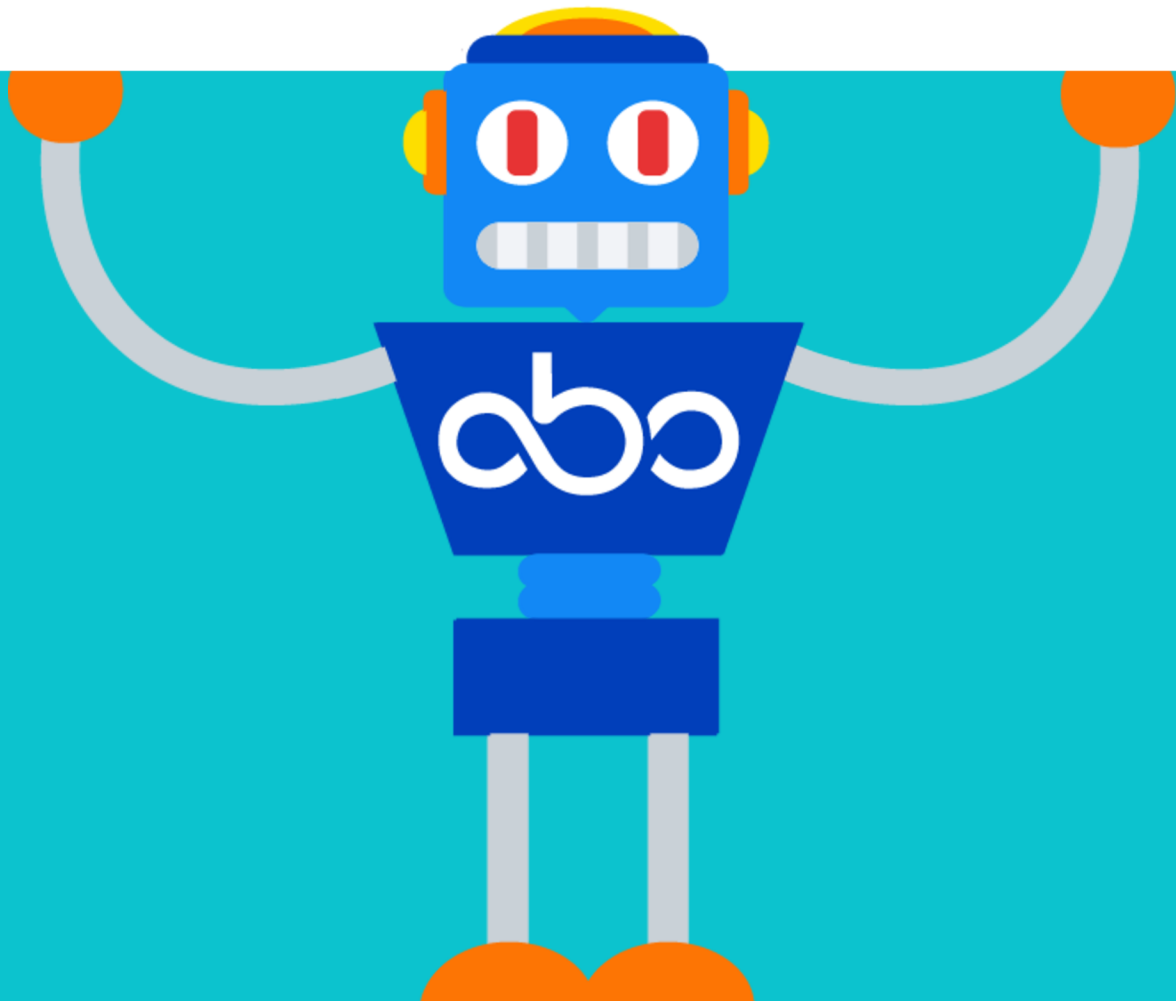




EU FOR ALL

Using Sustainable Entrepreneurship to Rebuild European Heritage for All





FROM PLASTIC TO FILAMENT

**A CLASSROOM
GUIDE TO
RECYCLING PET
BOTTLES**



The resources of the EU FOR ALL project, including the materials kit, 3D models, and educational proposals, are undergoing continuous improvement. We are constantly working to incorporate new ideas, adjustments, and contributions from the participating teams. Therefore, both the documents and files may be reviewed and updated over time.

www.euforall3dproject.com

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- The PET Filament Recycling Machine.

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👁️ Contribution to the Sustainable Development Goals (SDGs)

The project of building a PET filament recycler in the classroom promotes hands-on, environmentally engaged education. Through this initiative, progress is made toward several SDGs, especially in the following areas:



SDG 4: Quality Education

- The project promotes STEAM competencies (Science, Technology, Engineering, Arts, and Mathematics), supporting inclusive and high-quality education.
- By using digital tools such as Tinkercad and collaborative methods, hands-on learning and critical thinking are encouraged.



SDG 12: Responsible Consumption and Production

- Recycling PET bottles reduces the use of virgin resources and minimizes plastic waste.
- Transforming plastic into filament promotes sustainable practices in educational and community contexts.
- The focus on reuse helps students understand the environmental impact of their actions.



SDG 13: Climate Action

- By turning plastic waste into useful resources, pollution and landfill accumulation are reduced.
- Creating sustainable products from recycled filament lowers the carbon footprint associated with manufacturing new materials.



SDG 17: Partnerships for the Goals

- The project promotes collaboration between educational institutions, communities, and the technology sector.
- By encouraging cooperation between teachers and students, it generates a positive impact on the local environment.
- The connection with initiatives such as EU FOR ALL broadens the educational reach and fosters the exchange of good practices.



👁️ Recycling Challenge

Will you be able to turn plastic waste into a resource that can be useful for society, the school, or students?

[¿What Is a PET Filament Recycling Machine?](#)

A PET filament recycler is a machine that transforms used plastic bottles into reusable filament, which can be used in 3D printers to create new objects.

- It's not magic
- It's not just recycling
- It's not an automatic machine that does everything on its own
- It works because people think, decide, and create.

A filament recycling machine turns plastic waste into material for creating ideas. Do you recognize these bottles?

Plastic Waste			
Products Made with PET Filament			

🔍 What Types of Bottles Can We Use?

Research which bottles are suitable and which are not for filament production. Collect bottles at home to store them in the classroom or workshop for later use. Click on the QR code to watch a video tutorial on how to prepare bottles for recycling.



Scan the QR code or click on it to see how the bottles are prepared.



👁️ The PET Filament Recycling Machine

Our filament recycler arrives almost ready to use. The electronic components are already assembled to ensure safety and ease of understanding. You only need to assemble a few parts—such as the motor or the spool—to complete it and learn how it works.

🌟 Let's Give It a Name

The following parts come unassembled—can you guess what each one is used for? As a group, give these recycler components a name.

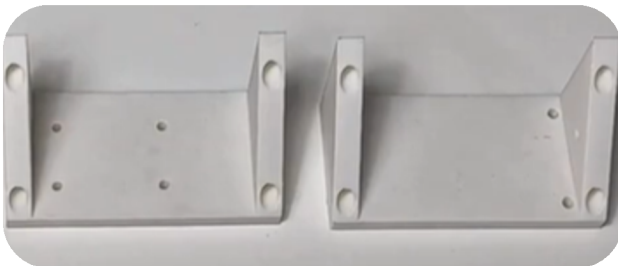
Scan the QR code or click to learn how to assemble the recycler.



Scan the QR code or click to learn how the recycler works.



What Would You Call These Parts?



I would call this part...



I would call this part...



I would call this part...



I would call this part...



Tools to Build Our Machine

Below, you will find various components needed for the assembly, operation, and setup of the filament recycler. Click on each one and drag it to the corresponding column.



Screwdriver



Screw



Batteries



Gloves



Soldering Iron



Drill

Safety
Goggles

Scissors



Hammer



Plastic Bottle



Saw



Can

NECESSARY

NOT NECESSARY



Get Your PET Bottle Ready for Recycling!

Below is a table to help you identify the required characteristics of the strip cut from the bottle. We will use a digital caliper to measure the thickness of the bottle. Once this value is known, we must adjust the width of the plastic strip we cut in order to obtain a 1.75 mm filament diameter.

Bottle Thickness	Strip Width	Filament Diameter
0.20 mm	10 mm	1.75 mm
0.25 mm	9 mm	1.75 mm
0.30 mm	8 mm	1.75 mm
0.35 mm	7 mm	1.75 mm
0.40 mm	6 mm	1.75 mm
0.45 mm	5 mm	1.75 mm

Here is a photo of a digital caliper. Have you ever used one before?





🔍 Online Research

Let's search on YouTube or online for a channel, account, or website where we can see how a filament recycler works. Explain to the class how to start it up, what safety precautions are needed, which types of plastic bottles can be used, and what can be created. Write what you find in the text boxes.

🔍 YouTube Channels, Accounts, and Information Sources

- Control 3D: <https://www.youtube.com/@Control3D>
- Social Media Channel or Feed: Link
- Social Media Channel or Feed: Link



🔍 ¿What other ways have you found to recycle plastic to make 3D filament?

- Plastic Pellets: <https://www.youtube.com/watch?v=leu-V4atWOk>
- Name of the Recycling Method + Link
- Name of the Recycling Method + Link



Once we have analyzed the video, in the next section we will create a diagram explaining step by step how this method of recycling plastic or waste filament works.

Name of the Recycling Method

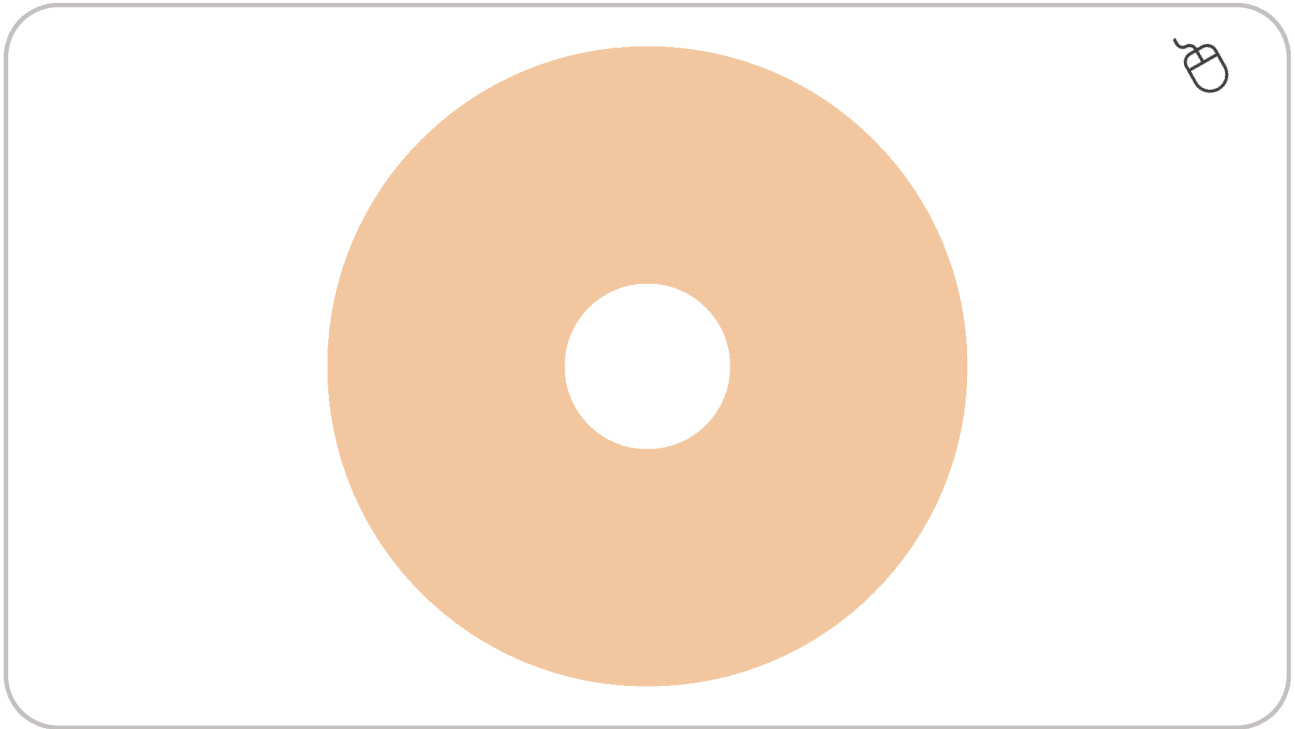
- Step 1:
- Step 2:
- Step 3:
- Step 4:
- Step 5:
- Step 6:





Designing the Spool

Use the spool shown in the image below to redesign it using Canva tools. You can color it, add graphic elements, and customize it creatively. Remember that you can zoom in to enlarge the page and work with greater precision.



Let's Get to Work.

We are going to collect all the cardboard we can find at home and/or in the classroom. Any cardboard works! We will build our own spools to store the filament and decorate them however we like. We will need scissors, glue, markers or tempera paint, table protection, and above all, lots of teamwork!

**WITHOUT
DESIGN**



WITH DESIGN



4

Design Phase

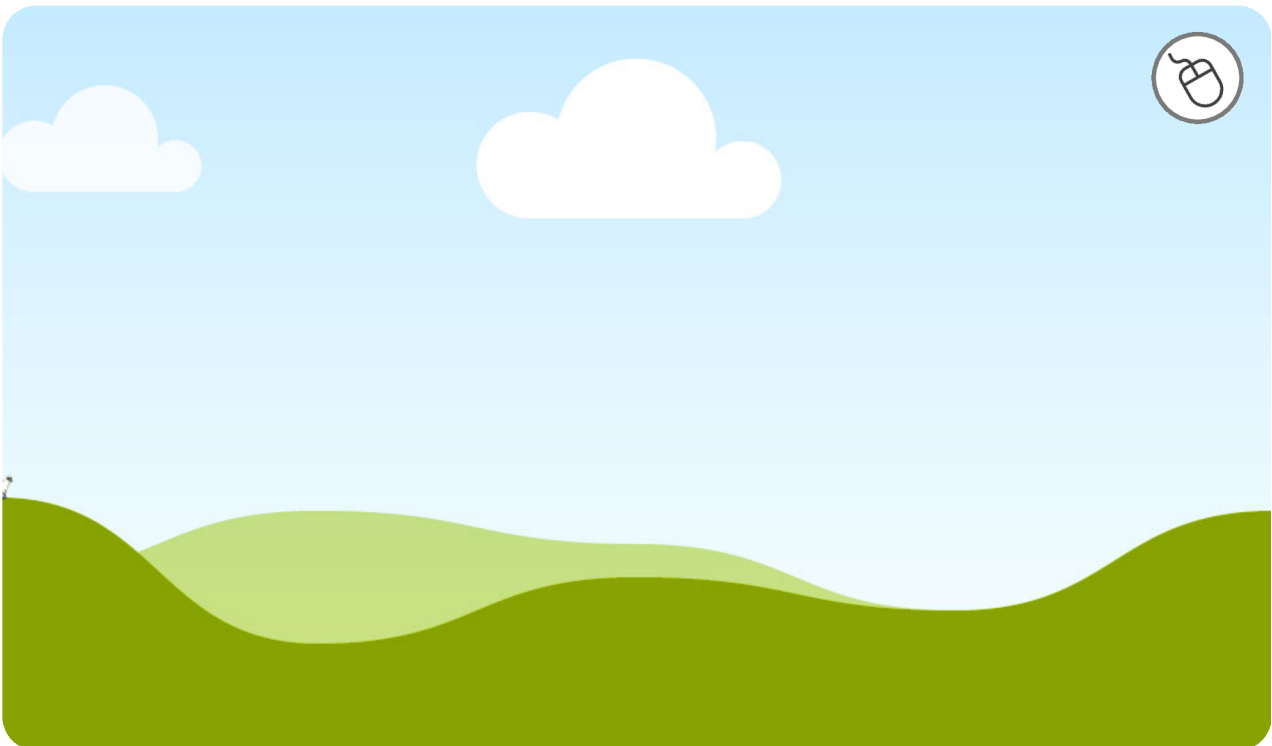
Customizing Our Recycler

Go to the following Tinkercad link and personalize your recycler. You can add shapes, the name of your school, your grade, or anything else you can think of. Let your imagination run free!

Then, take a screenshot and add the image to the frame below.



[Customize de recycler here](#)



Watch the video to learn more about Tinkercad!

In the following video, you can learn more about Tinkercad and its tools. Scan the QR code or click on it to access the link.



Scan the QR code to watch the Tinkercad video tutorial



3D Design of an Object in Tinkercad

In the classroom, around the school, or in the playground, there are surely objects or tools that could be 3D printed. Let's carry out a study on one item that could make everyday life easier for students or teachers using recycled filament. For example:

- Having spare classroom materials, such as a ruler designed in Tinkercad



**ALUMINUM
RULER**

**3D-PRINTED
RULER**



Printing with PET Filament

Here are the main printing parameters for using recycled PET filament from bottles. Scan the QR code to see how it is printed on a 3D printer.

Layer Height	0.2	Wall	2
Speed	70 mm/s	Top / Bottom Layers	4/3
Temperature	240° - 260°	Travel Speed	90 mm/s
Infill	15%	Build Plate Adhesion	No



Scan the QR code to see how the filament is printed.



Let's learn how to use artificial intelligence

Design a 3D model using artificial intelligence, based on what you have researched or thought about an object for the classroom, school, or surrounding environment—something that makes everyday life easier.

- **Think about what you have discovered:** maybe there are not enough pencil cases or pencil holders, eraser stands, or chalk boxes, for example.
- Imagine what the object could look like: a simple cylindrical shape, an open box for chalk, what shape it has, how it is used...
- **Write a prompt** to tell the AI what it should create.

What Is a Prompt?

A prompt is a sentence or idea that you give to an AI tool to create images or models.

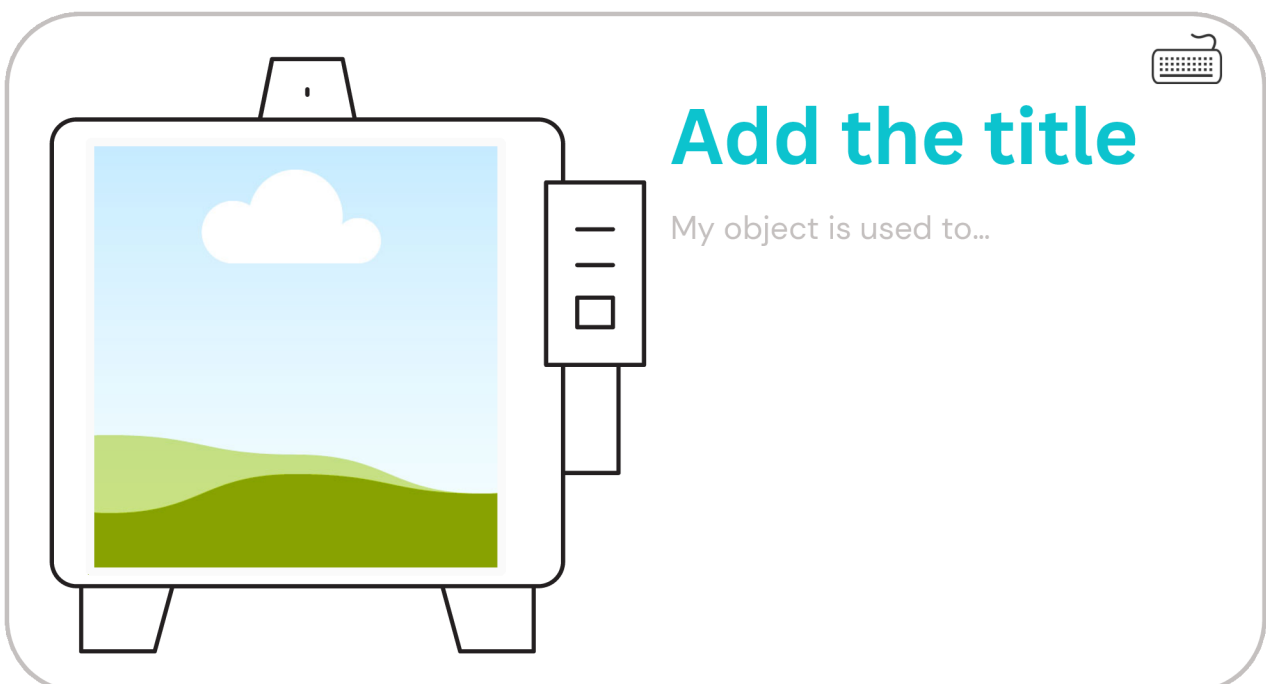
It helps the tool understand exactly what kind of image or model you want.

;The more creative and clear you are, the better the result will be!

Example:

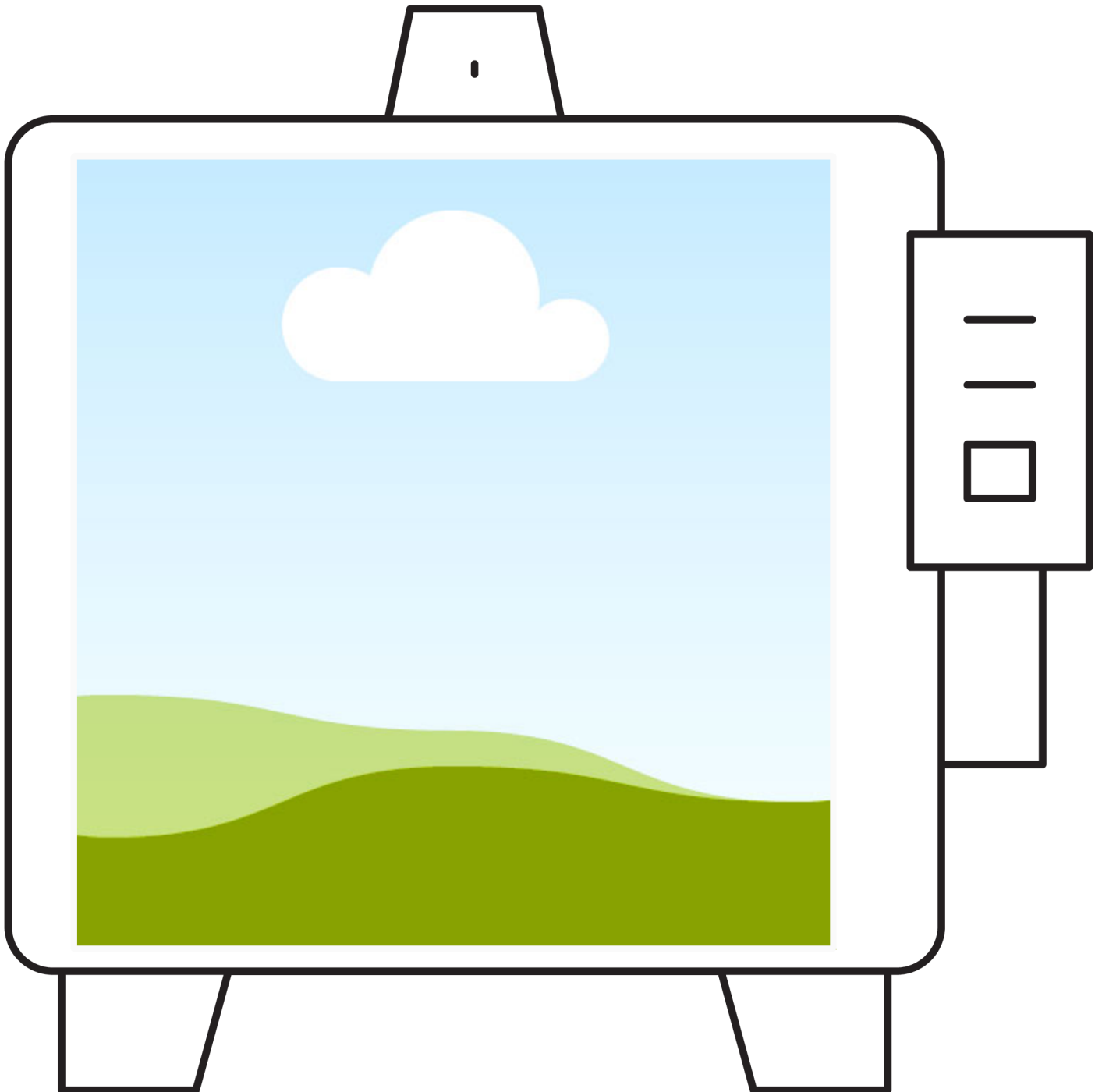
“A rectangular box to store chalk, a curved stand for headphones in the computer room, etc.”

- **Use an AI tool** such as Meshy.AI to generate the 3D model.
- Save or print your creation and place it in the special frame to present the object later.
- **Give your image a title and write a short sentence** explaining what it shows.



Please provide your name, your age, the object you designed, and then explain what it is used for.

My 3D model is used to...



6 Presentation Phase



📺 Create Your Explanatory Video

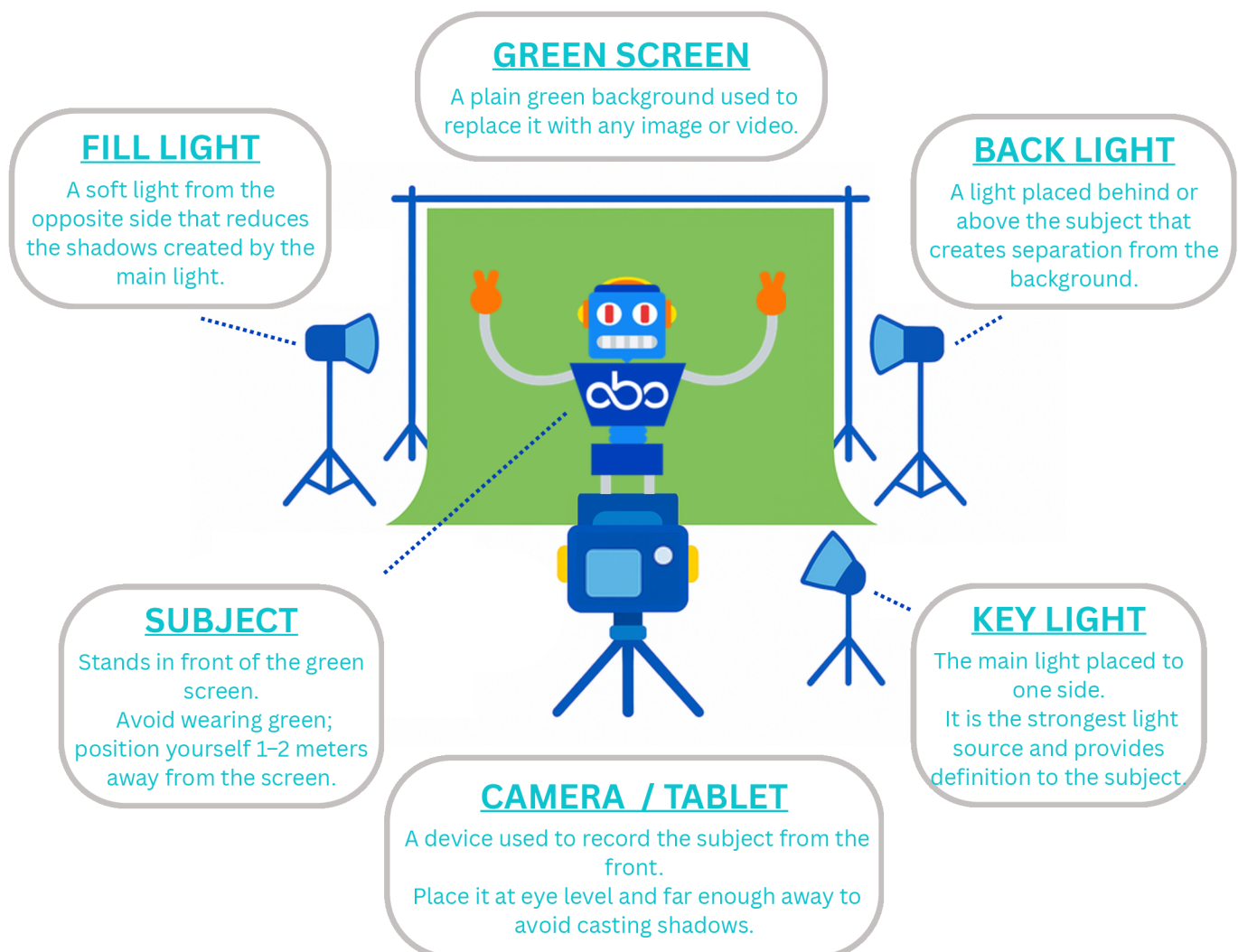
Create a short video in which you present the 3D model you designed, how you designed it, what need you identified in the classroom, and how it could be manufactured using the recycler.

- Write a short script as if you were a presenter.

"Hello, my name is [Name] and this is the model we created [image]."

- Use a green wall, a plain-colored background, or a green fabric.
- Record your video using a tablet or a mobile phone.
- **Share your video with your class and with us at www.euforall3d.com!**

[!This is how you should set up your green screen to record your video correctly!](#)



Terms of Use and Funding

The educational materials developed within the framework of the EU FOR ALL project, led by the consortium of OBO - We Teach Robotics, have been designed to promote digital inclusion and technological literacy.



These materials aim to provide accessible and engaging learning experiences that foster key competencies in digital skills, problem-solving, and critical thinking. Through interactive and hands-on approaches, the project seeks to empower learners of all backgrounds by equipping them with the necessary tools to navigate an increasingly digital world.

Developed in collaboration with experts in education, technology, and inclusion, these resources reflect the commitment of the EU FOR ALL consortium to innovation in education and the reduction of the digital divide.

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