Green ICT Detectives

Environmental Care Erasmus + Proyect

Co-funded by the Erasmus+ Programme of the European Union

3D Printing Repair, Don't Replace: Giving Technology a Second Life



This is a joint activity Between Green Detectives & 3D Academy

3D Printing as a Tool to Reduce Electronic Waste and Promote the Circular Economy

1. PROJECT RATIONALE

We live in a society where thousands of electronic devices, household appliances, and everyday objects are discarded every day. Mobile phones, computers, printers, small household appliances, and many other devices become waste, often long before reaching the end of their useful life.

One of the most concerning problems is that **many of these devices are discarded simply because a small plastic component has broken**, such as a gear, hinge, support, button, or casing. Even when the rest of the device works perfectly, the difficulty of finding replacement parts, their high cost, or their lack of availability can lead to the disposal of the entire product.

This situation contributes to the increasing amount of **Waste Electrical and Electronic Equipment (WEEE)**, one of the fastest-growing waste streams worldwide.



According to *The Global E-waste Monitor 2024*, approximately **62 million tonnes of electronic waste were generated worldwide in 2022**, of which only 22.3% was documented as formally collected and recycled.

Electronic waste represents a serious environmental challenge because it may contain heavy metals, hazardous substances, and materials whose extraction and production require significant amounts of energy and natural resources. Improper waste management can contaminate soil, water, and air.

2. 3D PRINTING AS A SOLUTION

In response to this challenge, 3D printing offers an opportunity to change the way we consume, maintain, and use technology.

Using 3D design tools such as SketchUp or Tinkercad, students can **design and manufacture replacement parts to repair objects that might otherwise end up in the rubbish**.

Additive manufacturing makes it possible to produce certain components on demand, reducing the need for large inventories of spare parts and avoiding the replacement of entire devices when a simple repair is possible.

In this way, 3D printing can contribute to:

- **Reducing electronic waste** by extending the useful life of devices.
- **Saving natural resources** by avoiding the unnecessary production of new products.
- **Promoting the circular economy** through repairing, reusing, and making better use of existing resources.
- **Reducing the environmental impact of consumption** when repairing an existing product is more sustainable than replacing it.
- **Developing technological skills** through 3D design, modelling, and manufacturing practical solutions.
- **Encouraging responsible consumption** by raising awareness among young people about the environmental consequences of a throwaway culture.

A NEW PHILOSOPHY: REPAIR, DON'T REPLACE

This activity encourages students to become active participants in environmental protection by identifying broken objects in their homes, schools, or local communities and exploring how they could be repaired using 3D printing.

The aim is not simply to learn how to operate a 3D printer, but to understand that **technology can also be used to protect the environment, reduce waste, and build a more sustainable society**.

Every repaired object represents an opportunity to prevent waste, save resources, and demonstrate that a small component can make a big difference.

Students will also be encouraged to consider the energy consumed, the materials used, and the waste generated during the printing process, ensuring that their repairs are safe, durable, and environmentally beneficial.

This initiative is directly connected to the **United Nations Sustainable Development Goals (SDGs)**, particularly:

- **SDG 12 – Responsible Consumption and Production:** reducing waste through prevention, repair, recycling, and reuse.
- **SDG 13 – Climate Action:** promoting practices that can reduce the environmental impact of manufacturing and consumption.
- **SDG 9 – Industry, Innovation and Infrastructure:** encouraging innovative and sustainable technological solutions.

EDUCATIONAL AND ENVIRONMENTAL IMPACT

Through this activity, students will develop practical skills in 3D modelling, problem-solving, creativity, and digital manufacturing while gaining a deeper understanding of environmental sustainability.

Working collaboratively, students from different European countries can share their designs, exchange repair solutions, and create a common collection of printable spare parts.

The project will also encourage students to reflect on the importance of extending product lifespans and reducing unnecessary consumption.

As a final activity, students could organise a **"Repair, Don't Replace" exhibition**, presenting broken objects, their 3D-designed replacement parts, and the successfully repaired products.

Each project could include photographs, 3D models, printing information, and an estimation of the waste prevented through the repair.

This would provide a practical and visual demonstration of how digital technologies can contribute to environmental protection.

3. CONCLUSION

"Don't throw it away. Design it. Print it. Repair it!"

Through this project, we want to show students that technological innovation is not only about creating new products, but also about finding intelligent solutions to preserve and improve the products we already have.

3D printing therefore becomes a powerful educational tool that combines creativity, engineering, sustainability, and environmental responsibility.

Repairing can be just as innovative as creating something new.

By giving broken objects a second life, students can discover that small technological solutions can contribute to addressing major environmental challenges.

"Small Prints, Big Changes – Repair Today for a Greener Tomorrow!"

Reference: UNITAR & ITU, *The Global E-waste Monitor 2024*. https://ewastemonitor.info/the-global-e-waste-monitor-2024/