Old toys to new toys

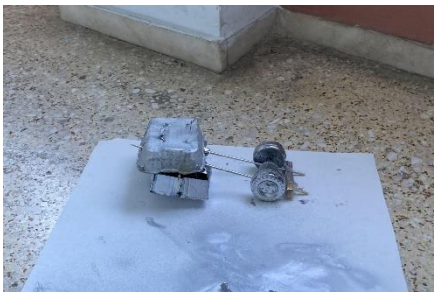
TINK@School

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

Old toys to new toys

Duration	*4-5 sessions of 60 min each*
Target group	*e.g. students 12-13 years old (with some experience of circuits).*
Connection to curriculum	*This activity can be linked to subjects of science (electricity, circuits), Arts*
Particulars	*Takes place indoors; suggested to work in pairs*





Outline

The participants are asked to bring old or broken toys (ideally with batteries), they have at home. They are invited to dismantle them to see the mechanisms hidden inside. Once they are familiarized with the interior and after testing if they can repair the toy, they are invited to re-connect parts and make a new toy or sculpture or movable device. To do that a bunch of other materials from the recycling bin will be required.
* In case of participants unfamiliar with tinkering, the whole first session could be devoted to explaining the methodology, demonstrating it through videos and photos, and trying out a simple tinkering activity, e.g. “Tinker your name”.

Connection with sustainability

Students are explained the meaning behind tinkering and the now vanished profession of tinkerer, that has to do with repairing, improving and reusing things. This “old way of doing things” is closely linked to the modern day principles of circularity, zero-waste, and sustainability.

Students are invited to give a new life to broken toys that were non-functional. They are also invited to use a bunch of items from the recycling bin. In this context we can talk about the options of reusing, recycling, and upcycling, and debate on which of these verbs is more important for managing our wastes and why.

EU Waste Directive:
Preventing waste is the preferred option,
and sending waste to landfill should be the last resort.

Health and safety

Hazard	Controls
Cut in finger	*Explain to students the dangers of cutters, and hammer beforehand; have a first aid kid in the room; be alert to help them at certain points*
Toys that have to be plugged in	*Avoid them, use only toys that work with batteries, or stuffed toys*
Soldering wand and tin	*Becomes very hot, use with caution and under supervision*
Batteries and short circuit	*Remove all batteries from toys ad the end of the activity*

Essential materials

Item	Comment	Total (for xx persons/pairs/groups)
Broken toys	*They can be brought by the students, or ask a local thrift shop if they collect them for you.*	*At least one toy per pair*
Batteries	*Of different voltages, e.g. 1.5V, 3V.*	*At least 4 per pair*
Battery holder	*For 2 or 4 batteries*	*At least 1 per pair*
Electrical wires		*Plenty*
Light bulbs or LEDS	*At voltage fitting the batteries*	*At least 1 per pair*
Aluminium foil		
Materials from the recycling bin	*E.g. containers made from cardboard, plastic or metal, toilet paper rolls etc. The materials can be collected in advance.*	*Plenty*
Big size papers (At least A3)	*To make the diagram of the toy circuit*	*1 per pair*
Markers / pens	*To make the diagram of the toy circuit*	*2 per pair*
Elastic bands		
Clothes pegs		
Corks		
Rope / String		

Scotch tape		
Glue		
Containers / empty boxes	*To store components extracted*	*1 per pair*
Fabric	*For stuffed toys*	

Essential tools

Item	**Comment**	**Total (for xx persons/pairs/groups)**
Scissors		*1 per pair*
Cutters		*1 per pair*
Screwdrivers	*Of different sizes and shapes*	*At least 1 per pair*
Wire stripper		*Have available at least one*
Glue gun	*Optional*	
Soldering tin and Soldering iron	*Optional (for advanced groups)*	
Needle and thread	*For stuffed toys*	*Set per group*

Preparation

Prepare the room: If possible, use three material tables spread around the room (a. for essential tools, b. for essential materials, b. for other materials, e.g. from the recycling bin). By making the students walk around you foster their creativity and support them to draw inspiration from the work of others.

Alternatively,if you don't have space, you can bring together the tables to create a central big surface, and have the pairs work around it.

Make sure you have the right tools (esp. the screwdriver size and type) to open the toys.

Activity Plan

Introduction

- Present yourselves and briefly explain tinkering (what is tinkering, what could be its possible outcomes, how it links to circular economy & sustainability).
- In case of participants unfamiliar with tinkering, the whole first session is devoted to explaining the methodology, demonstrating it through videos and photos of examples, and trying out a simple tinkering activity, e.g. “Tinker your name” with materials from the recycling bin.
- Present the outline of the “Old Toys to New Toys” activity (what is the room set up; where to find essential materials & tools; what will be the duration of the activity; how students will work in pairs; how to leave the room before the session ends).
- In case of electronic toys, explain what an electronic circuit is and that the circuit needs to be closed for electricity to flow through. Most circuits use a power source (e.g. battery), wires (to transport electricity) and something that uses the electricity (e.g. a lamp). If there is not something that uses the electricity in a cycle, this might cause it to short circuit.
- Prompt the challenge: “Our goal for the next sessions is to experiment with old toys: open them, see what is inside, understand how the toys work, and then use these elements together with items from the recycling bin to make a new toy or structure (with movement or without).”
- Underline some safety rules (especially for tools like cutters and hammers)
- Encourage the students to try, fail, adapt, get inspired by the projects of others, ask and give help, discuss. Insist that “failure” is an integral part of tinkering, and that we should not be put off by it, but see it as an opportunity to test something different.
- Optimally discuss if and how their projects will be showcased at the end (exhibition, school bazaar, movies, photos).

Managing the activity once it is in progress

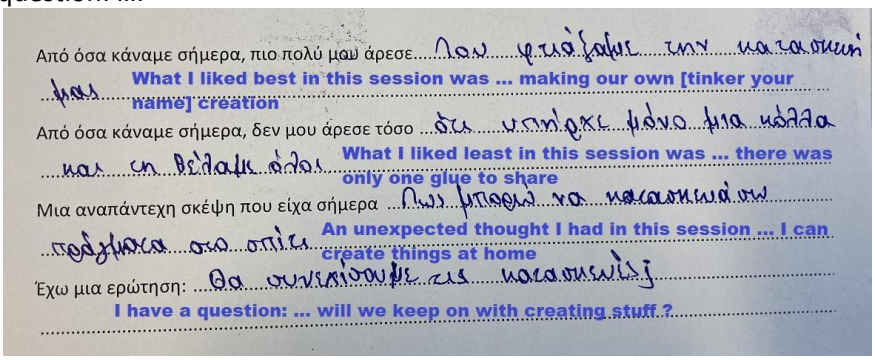
- Encourage students to take their time to observe the outside of the toy, look for switches, moving parts, etc., and convey these in a diagram.
- Once the students have opened their toys, help them to identify some basic elements that can be found inside (e.g. battery packs, alligator clips, motors, speakers, resistors, LEDs, switches, gears). If they can repair a toy, congratulate them and ask them to pick another toy to dismantle.
- While dismantling, one tricky moment is when it looks like it’s not possible for the toy to be further taken apart. Encourage learners to look for hidden switches and seams, before they use a saw or hammer.
- Once all “toy-guts” are exposed and students are familiar with the basic elements of their toy, they can reconnect them into their personal toy or project.
- During the activity pairs will not progress with the same pace and creativity. Support those feeling frustrated by giving them alternative scenarios for their progress. Those that are more prone to circuits may create something with light or movement. Explain to all that it’s OK also to have as a result an artistic creation (a standing sculpture, a Christmas decoration, a souvenir for their room etc.), as long as it’s meaningful to them.
- At the end of each session reserve 10 minutes in order for students to collect the materials in their boxes and tidy up the room.

- At the end of the session, save some time for the debriefing: Ask pairs to also note their progress (e.g. reflect on learning, explain what they have changed about the toy/what they have built, etc.). and what they plan to do in the next session. During the pilot it was observed that some groups diverted their whole creation from one session to the next, starting building something new every time.

Conclusion

Evaluation can be done in various ways. Depending on the time and the circumstances we suggest the following:

a. Asking students to fill in an anonymous mini survey at the end of each session with the following questions:
   - What I liked best in this session was …
   - What I liked least in this session was …
   - An unexpected thought I had in this session …
   - I have a question: ….

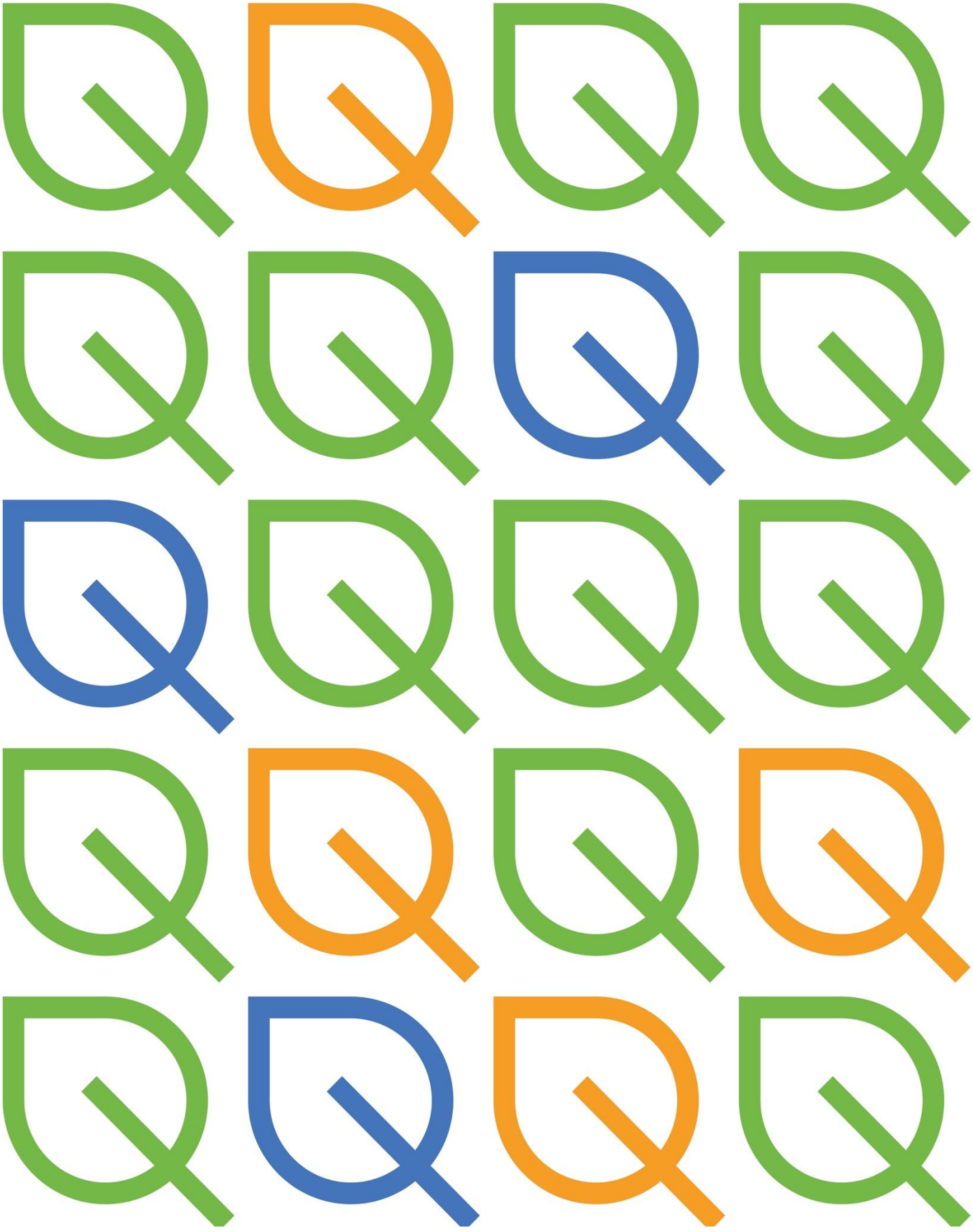


Filled evaluation Card from the first session during the Pilot

b. Having a debrief discussion with the class teacher after the end of each session (especially if you are an external facilitator, not familiar with the participants). The teacher's comments are useful inputs for improving the next session.
c. Having a wrap- up discussion with the students at the last session to collect their impressions and connect the whole tinkering experience with the principles of sustainability and circularity.
d. Discussing with the teacher the elements of the Learning Dimension Matrix on Making and Tinkering.

Extra tips for teachers:

- It is suggested that the group size does not exceed 12-15 students, especially if there is only one facilitator.
- The results will be different if you hold the whole activity in a single 4-5 hour long session. Some pairs diverted their whole idea of "what to create" from one session to the next.
- Taking toys apart creates a large amount of waste. It could be helpful to have bins to sort out skins, plastics, stuffing and mechanical parts. These bins can be the raw materials for making new creations or as material in other activities, but in the end a lot of waste remains. The bulk of resulting waste gives the opportunity to discuss the "buy-use-throw" culture that is imposed on our modern societies from a young age.
- This activity can be also done with stuffed toys, especially for younger students.



Appendix

Examples of possible outcomes / Piloting with the 1st Highschool of Athens

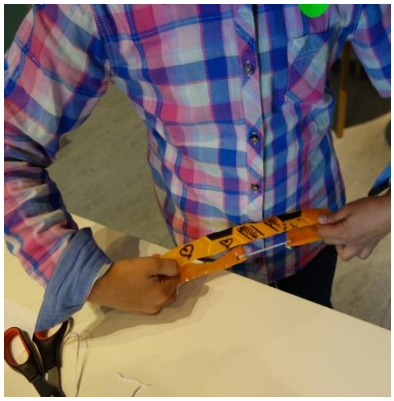
This group did not divert a lot from their original plan: They created a bulky night decoration element for a child's room and they intend to sell it in the School Christmas Bazaar.

This group finally opted for making a small size projection screen that is led through the "leg" of an old toy. They made the figurines to be projected and also wrote a script to play.

This pair dismantled a toy-car. They experimented with making a rotating mill (a), but finally they resulted to a moving device (b), which they also decorated (c).

And **video** of preparing their "Mars-Vehicle" to move

Other toy making tinkering activities for inspiration



Credits: Judith Bal, NEMO

Credits: Agency by design – Instagram

Credits: V. Malotidi

"Franken toy": Incorporate elements from several toys

"Inside Out": Reverse the Skin and sew again

De-soldering elements to re-attach them to a new circuit (and toy)

Source: https://www.exploratorium.edu/sites/default/files/tinkering/files/Instructions/toy_take_apart_0.pdf

Tinkering with movement (videos)

Source: Twiter: @ryanejenkins - https://t.co/bakqSAXI6M

Source: https://t.co/HQLs3vaQS7

Tinkering with light

www.instructables.com/Tinker-Bell-Pixie-Pumpkin-Carving-Poeira/

www.instructables.com/Pipe-Cleaner-LED-Christmas-Decorations/

www.instructables.com/Design-Build-Reiterate-and-Light-It-Up-Circuits-an/

Colophon

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