



Entrepreneurial skills
for young social innovators
in an open digital world



Workshop Description

FUTURE MONSTER LAB

**mediale
pfade**



This project has received funding from
the European Union's Horizon 2020 research and innovation
programme under grant agreement No 770063



CC BY 4.0
(<https://creativecommons.org/licenses/by/4.0>)
DOIT <http://DOIT-Europe.net> | H2020-770063



FUTURE MONSTER LAB

A makerspace workshop concept for elementary school children that focuses on the future of our planet and finds problems, fears and solutions.

The FUTURE MONSTER LAB is a multi-day workshop for children aged 6-12, where they build future monsters out of old electrical appliances and packaging waste. These monsters respond to urgent environmental issues such as garbage, microplastics, the climate crisis or sustainable mobility. In order to magnify the children's ideas, electronic technology becomes an integral part of artistic-creative expression and playfully model solutions. Colorfully blinking LEDs, small humming engines, rotating small ventilators are part of the monster – newly soldered and connected – and emphasize the messages of the children.

The monsters introduce creative recycling ideas, they might vacuum waste from the sea, draw attention to the CO2 emissions of cars or focuses on renewable energies. Monsters with purpose are created, that embody or emphasize certain messages. This is achieved through features that are either indicated through a model or actually realized through the implementation of technology. Examples are a garbage gripper monster that is active on land, water and in the air; monsters that include a sophisticated recycling process as part of their digestion system; monsters with fans for clean air, monsters with CO2 converters or filter devices for microplastics in the sea you name it.

The FUTURE MONSTER LAB is a sustainable upcycling workshop, because the participants independently rescue almost everything they need from old electronic devices and also use packaging waste in order to build their monsters. Electronic waste becomes a valuable resource for great monster components. The participants with the help of the facilitators take out cables, switches, LEDs, motors and other valuable parts such as fans, buttons or cases from non-functioning computers and printers or other appliances. The black box “technical device” reveals itself to children through the act of disassembling (not destroying), and they understand that complex devices are just a combination of a variety of often known individual parts.

The decomposition allows insights into materials, connections, but also in basic contexts of electronic technologies and circuits. Since the children also use construction material for the monsters that are usually considered garbage, recycling garbage is a crucial educational element of the workshop. At first, children collect, sort and clean boxes, styrofoam, wood scraps or plastic cases at home or in other educational spaces. A valuable discussion about consumption and packaging, waste prevention and recycling arises.

Another central element of the upcycling workshop within the context of education for sustainable development and environmental education is the future workshop - besides the hands on construction. Areas of interest or concerns are discussed here, children receive further information. Knowledge is being exchanged and acquired and can be used for planning the monster.

The Future Monster Lab is a MakeSpace for children that offers lots of room for lots of experimenting and fiddling. In contrast to the associative and open creation, the objective is to find the best ideas and develop





them systematically and exploratively, in order to implement them into the monsters. However, the focus is not on perfection, but experiencing the workshop as a process, where childish imagination and creativity is not limited, and the ideas of children can flourish.

The young monster developers work in teams in order to make their monsters strong, think ideas well through and manage the technical challenges of the construction. Their process is supported by a team of adult facilitators and a child-friendly workshop environment with well-equipped work spaces. Besides gaining access to tools and equipment, the participants also receive support such as visualization or other methods that help them find out, how their monster will look like and what it can do. These tools and methods are sequentially introduced during the lab and help the children organize their work process.

There are different phases such as the collection of ideas, the development of a prototype, intensive planning phase and the following construction phase which takes place in smaller groups.

The workshop is developed for 3 - 4 days. It can be implemented in a project week in schools (suggested up to grade 6) and is especially suited for extracurricular (family-/)vacation offers. The minimum duration is 10 hours. Additionally, it is recommended to plan for not less than three hours per day in order to enable a flow. The recommended caseload should be no less than 1:6.

The workshop needs appropriate rooms that enable a separation into different spaces (workshop and group circle - the monster council) as well as offers enough space for the different teams that consist of up to 5 participants that work on their monster together.



Duration: 3-4 days / max. 5 h per day
Setting: after-schools & project week in schools
Group size: 15 – 20 children
Age: 6 – 12 year





Day 1

FIRST MONSTER LAB COUNCIL Welcome + Introduction + Get to know – 15-30 min

In order to create a good working lab and a positive community out of an often heterogeneous and mixed age group for the duration of the project, it helps to get together on a regular basis as a whole group outside the main workshop space - apart from content and the practical work.

An area for seat cushions or a chair circle should therefore be permanently located in another room and visually marked - such as colored textile tape / Gaffa tape and a corresponding shield - the MONSTER LAB COUNCIL

Faciliator tasks:

- Introduction of team
- Introduction of schedule
- Moderate an introduction round
- e.g.: who am I? what is my favorite nature space

Material / Equipment:

- enough space for all participants to sit in a circle - if possible also suitable for smaller team games and warm-ups
- Presentation surface / wall for posters, posters, ...
- Colored tape / gaffa tape
- MONSTER LAB RULES
- MONSTER MASCOT

Objectives:

The MONSTER COUNCIL starts and concludes the day, discusses organizational matters and strengthens and promotes fair and respectful behaviour and a positive group environment: in the council the group comes together as a team; Successes are celebrated and conflicts are resolved.

In order to establish a collaborative culture of cooperation, the MONSTER LAB RULES help. They have the function of a Code of Conduct or group rules.

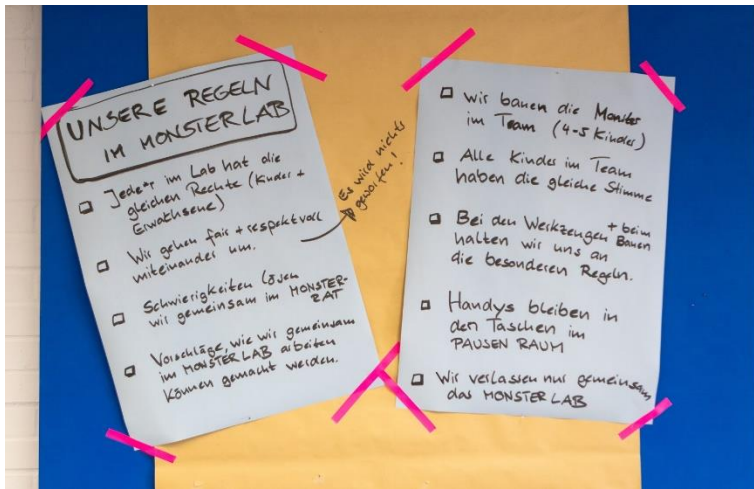
- Introduction of team
- Introduction of schedule

Tipp:

Add some WARM UP and icebreaker tools (browse the DOIT TOOLBOX)



MONSTER LAB RULES – 15 min



Codes of conduct also help in open labs or adult maker spaces and can support the creation of a collaborative culture and a good working environment. This agreement establishes rules on how each individual should behave in the workspace for everyone to have a good atmosphere for building, fiddling, and sharing knowledge and constructive criticism. These Codes of conduct are usually known from rule books used in class councils.

Facilitator tasks:

Moderate the rules gentle, clearly and participatory

- why do we need rules and guidelines
- are there points missing ?

For the social aspects, the following sentences are appropriate:

- Everyone in the lab has the same rights - children and adults (not the same roles)
- Everyone can make suggestions on how to work well in the MONSTER LAB
- We treat each other fairly and respectfully.
- We solve difficulties together in the MONSTER COUNCIL
- We build the monsters in small groups
- In the workshop we also pay attention to the special WORKSHOP RULES

In addition, specific / organizational rules can be established here:

- Smartphones stay in the break room
- We only leave the MONSTER LAB together
- Eating and drinking is possible at any time in the break room

Objectives:

For the duration of the project, all participants agree on common rules, which have to be understood by everyone and placed visibly in the room, so everyone can refer back to them in case of conflict

The initially discussed joint agreement creates identification and cohesion and ensures an agile and participatory atmosphere in a MONSTER LAB.

Equipment / Material:

Large poster in legible script

large and visible wall space in the MONSTER COUNCIL



FUTURE WORKSHOP – 30 min

In the future workshop (Zukunftswerkstatt) the group elaborates together, which developments and changes on our planet children are worried about - particularly regarding the environment or changes in natural- and urban spaces. In an open-ended process, information is gathered and organized by questions and additional information. Even threatening things are discussed and taught in a child-friendly way. The monster narrative is utilized as a strategy - a strong friend is able to confront and counteract fears..

1. COLLECTING FUTURE SUBJECTS: a conversation without monsters

The FUTURE MONSTER LAB creates monsters with meaning - they convey answers and solutions to urgent questions in the field of ecology, sustainability, climate change, environmental protection and critical consumption. The social challenges are looked at, better understood and ideas for necessary social and technological changes are incorporated. The challenges are not just for children extremely complex. It is important to include topics and thoughts of children about “the future of our planet” with the provided range, but it is also necessary to gather these ideas and add professional depth.

That is how the monsters get stronger - the messages get clearer, the inventions more diverse and goal- and solution oriented.

Implementation: The first key question from MONSTER SKETCHBOOK gives the impulse for a first introduction to the topic: "What does the world look like when you grow up?"

In the MONSTER COUNCIL, contributions and ideas are collected by shouting out or hand signals. A structured, encouraging discussion with a first classification and clarifications is important. A second question can direct the discussion of individual future concerns towards the direction of social demands: What do you know from the news or from conversations of adults?

The question about the future of our planet can direct the debate towards ecological aspects and sustainability topics.

The facilitator collects keywords on cards. It is helpful to use a color code to separate problem areas (e.g. green) from deeper individual aspects and suggested solutions (=yellow). Subsequently, clusters should be arranged. Experience has shown that the topics of waste (pollution, recycling, plastic waste) and climate change (CO2, transport, forest protection, regenerative energies) are often discussed.



**TABLET RALLY: Environmental issues – 45 min**

In order to make the statements of the monsters even stronger and to underpin the functional ideas of the children with factual knowledge, the second phase of the future workshop consists of a tablet rally. The rally is a small in-depth learning journey that includes topics such as plastic waste, pollution of the oceans, recycling and climate change. The method TABLET RALLY or digital scavenger hunt builds on the didactics of mobile learning: Content is divided into learning steps, in text form, image or as audio-visual formats in digital form, offered on a tablet or used as a direct Internet resource. A playful framework provides motivation and the children pay special attention, because the rally takes place outside of frontal learning settings. Individual stations can be accessed via QR codes that are scanned with the tablet.

Small work tasks are built into the rally, such as the creation of a poster or the collection of different types of plastic.

Preparation: Adaptation or redevelopment of the theme rallies. A template can be found here.

<https://pad.medialepfade.net/TABLET-RALLEY-UMWELT>

Print QR codes. A QR code generator can also be used to create, download and print QR codes from new pages / URLs.

On site: make sure there is WLAN. Connect tablets to the Internet. Install QR code scanner (if not integrated in camera)

Implementation: form groups of about 2 - 5 children. The groups get their starting code and, depending on the tasks, poster paper and pens. If the codes are not hidden (hints for finding them must be added to the TABLET RALLY itself), a simple station can be identified where the groups will each receive their next code.

Tip:

Because open tools such as HackMD / Pads and QR codes are used, these learning trips can be personalized, adapted to topics and learning groups, and transformed into a real scavenger hunt on the spot. It is also possible to work in an analogue theme workshop with small groups or to completely work without Internet resources



MONSTER PROTOTYPE: a first quick model – 60 min

Before the monsters are built in groups of up to 5 children, the intermediate step of an individual prototype has proven to be useful. In addition to the first drawings in the scetchbook, the first idea of a future monster is transferred into a simple model. For this, the kids are allowed to use a very limited selection of materials: cardboard, egg cartons, toilet paper rolls.

As connectors they can use crimp and plug connections, craft glue and masking tape. Electronic components are purposely not offered in this step as it should be an addition to drawing sketches. By reducing to a few forms and materials, the focus lies on the associative, free construction. Afterwards, all participants present their prototypes. Diversity of topics and overlaps become visible. Based on this, the optimal teams are formed according to interests (eg plastic waste collectors, CO2 converters, ...).



Duration: Construction (15-30 min) | Presentation (15 - 30min)

Material:

- Flat cardboard pieces
- egg cartons
- toilet paper rolls
- other cardboard packaging
- Masking tape

Note / Tip:

Some children work very hard on their individual monster prototype and identify with their character. Since the actual monster is built in teams, the prototypes can be taken home.

Presentation & End-of-Day-Reflection – 30 min

Show of the individual Monster Prototypes
Reflection on what habppend at Day 1. Informing about upcoming day.



Day 2

MONSTER LAB COUNCIL Start-of-the-Day – 15 min

Warm up, focus on schedule – what will happen today?
Introduction: guidelines for usage of tools in Makerspace.

WORKSHOP RULES – 15 min

The workshop rules are a set of rules that primarily intend to minimize the risk of injury, with maximum independence of the participants. The rules can be adapted to the respective tools and age group. They should be written in large format on posters, introduced in the MONSTER COUNCIL and placed visibly in the workshop.

Central rules that have to be worked out and explained together with the children:

- We share all tools and materials.
- We are helping each other.
- We return tools we do not need anymore to their place.
- There is no romping in the workshop.
- We use the soldering and glueing station ONLY with the supervision of an adult.
- No child puts anything in the sockets!
- Devices can never be connected to electricity when they are disassembled!

Example of how to put the rules in longer phrases:

- The tools are there for everyone - what you do not use is returned to the tool store.
- Watch out for you and the others!
- The hot glue guns and soldering irons are exclusively used at the respective table and together with an adult supervisor
- Saws and cutters are in possession of the facilitators - talk to them if you need them.



DISASSEMBLING OLD EQUIPMENT– 75 min



THE FUTURE MONSTER LAB is not just a place to reflect about sustainable consumption, waste issues and environmentally friendly actions, but also anchors them in a practical didactic approach:

The building materials for the monster are preferably recyclables - meaning components of old electronic equipment and packaging materials. The disassembling of old equipment also has a special didactic function:

The purposeful dismantling (not destruction) opens the black box “technical device” to children and they see, that even complex technical devices are made out of a variety of - often known - individual pieces.

The understanding of the function of these pieces is particularly increased, when the electronic components are being reused and re-installed in the monster. The young participants are getting a first in-sight into electronics and simple circuits when using and reassembling old switches, LEDs, motors or fans and old cables for their monsters.

Objectives:

- Find components for the monsters
- Encourage understanding of the device design and procedures for opening them

Implementation:

At the beginning, the WORKSHOPS RULES, such as the use of tools, workshop behaviour and safety rules, should be introduced clearly and firmly. Each team searches for one or two devices that contain previously determined components for the monster. Once again, the question should be emphasized: which parts are we looking for?

Tip: Because the motivation of some children is very high to disassemble several devices and children might work at different paces, it is recommended to have a look at all the rescued devices and parts with the entire group and distribute the parts fairly.

Material Fund / Broken devices:

- | | |
|----------------------------|--|
| Servers / PCs / Laptops | Printer (caution: remove ink cartridges before!) |
| VHS and cassette recorders | Electric toys |
| Keyboards and consoles | Electric Toothbrushes |

Forming Teams - based on common ideas – 30 min

The monsters are built in teams of 2 - 5 children. The groups go through a design phase together and agree on a common goal. Each team gets a fixed contact person /facilitator and is closely accompanied in the development and construction process. The person supports when there are doubts about the procedure and provides motivational impulses without influencing or taking over the process. It settles conflicts and makes sure, even during the teamwork, that the MONSTER LAB RULES are followed (often especially with regards to: everyone has the same voice).

BRAINSTORMING TABLECLOTH - 30 minutes

This form of brainstorming method is particularly useful in a phase, when the newly formed teams have come together to build their monster - on a personal and a content level.

When the team brainstorms ideas directly on the tablecloth in their own team space, everyone's ideas and thoughts - as previously created in the sketchbook and the prototype - are collected and combined. First conversations and exchanges of ideas about how the common monster could look like take place.

Implementation:

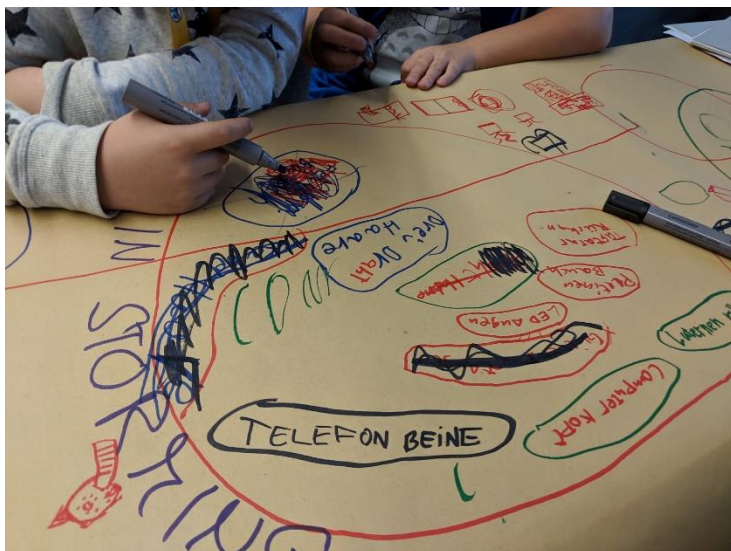
Experiences show it makes sense to pre-structure the big sheet of paper a bit. It is not easy for children to just start writing something. Dividing the area by simple circles provide the necessary orientation so everyone knows where to start writing or drawing. It is also important to emphasize again and again that spelling, grammar or writing are not important.

Objectives:

- Stimulate and release creativity and imagination
- Design and collect ideas
- Encourage exchange about individual ideas
- Develop common visions of a future monster

Material:

- Wrapping paper (best to fixate the paper as a tablecloth onto the table surface (with masking tape)
- Markers / thick pencils (one for each child)





FOCUS POSTER - Construction plan and material list - 30 minutes

Building on the free brainstorming phase, it makes sense to support the ideas of the MONSTER LAB participants, to work towards a common goal that can be mastered even within a limited time frame. The team decides on a construction plan and records it on a pre-structured poster, the FOCUS POSTER. The process is supported by concrete questions that help the group to agree on key points. This is the place to really develop a shared vision of the monster, with creativity and imagination being stimulated and funneled once again by the method.

Objectives:

- Develop a common vision of a future monster.
- Concretize ideas and make them be understood by everyone in the team.
- Create a construction plan and material list for the construction phase.

Preparation:

FOCUS POSTERS should be prepared before the workshop unit starts. A clear visualization is especially helpful for beginners. In addition, a graphically appealing division triggers motivation and supports understanding. The FOCUS POSTER contains the following four sections

- 1 Name of the team members
- 2 What problem does the monster solve / what does it indicate?
- 3 Sketch of the monster
- 4 Which material is needed?

Implementation:

Every team is provided with a prepared FOCUS POSTER at their team space, as well as markers. The team receives the task of filling out the poster, taking the necessary time.

Duration: 15 min - 30 min

Presentation & End-of-Day-Reflection – 30 min

Each working group presents their monster master plan – other children can ask.
Reflection on what happened at Day 2. Informing about upcoming day.

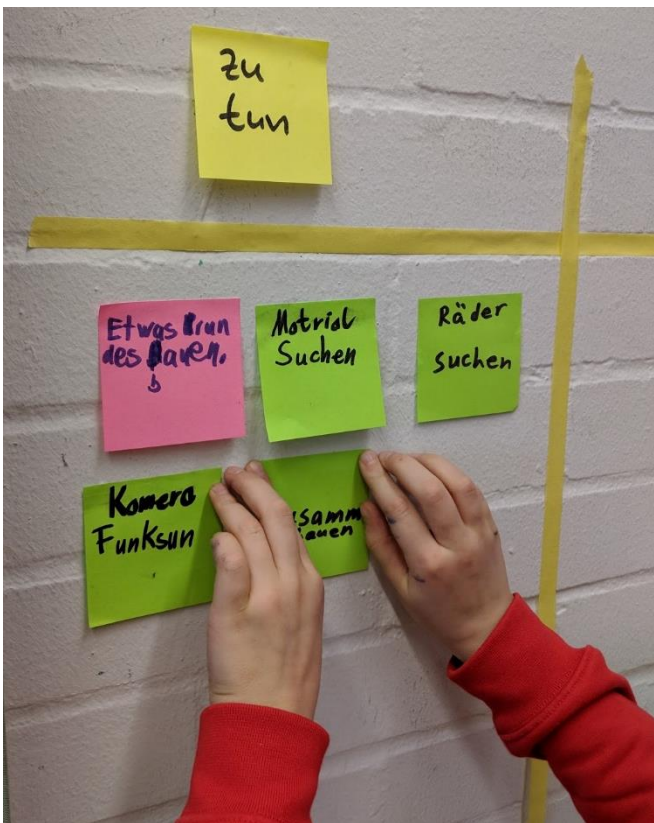


Day 3

MONSTER LAB COUNCIL Start-of-the-Day – 15 min

Warm up, focus on schedule – what will happen today?

KANBAN BOARD - Lacing and distributing work packages – 15 minutes



In order to guide the teams from the idea finding phase into the phase of practical work, a Kanban board helps. The three to-do lists (TO DO - DOING - DONE) help the children organize themselves. This method makes the construction process comprehensible and visible to all team members, so the division of labor gets easier. It makes sense to introduce the Kanban board tool directly to each team during the construction phase. Here, individual comprehension questions can be clarified even better and the group can have a look at the work steps together.

Objectives:

- The blueprint is broken down into individual process steps.
- The children keep track.
- Work packages are distributed.

Implementation:

Each group workplace should be assigned a wall area in addition to the table space (also windows and doors). The board can be visualized very easily with masking tape and post-its / sticky notes: TO DO - DOING - DONE.

Duration: 10 min introduction + a few minutes during the entire construction phase every once in a while

SIMPLE CIRCUITS + SOLDERING – 10 min / per child

By disassembling and reassembling, the participants actively acquire knowledge about the functionality of electrical circuits. Depending on the amount of available facilitators, the circuits can be soldered. Alternately, you can use less permanent connections (such as crocodile clips).

It may also be helpful to determine at the beginning of the planning, how many electronically operated features the monsters will have. That way it is easier to plan how much supervision each station needs.



Objectives:

- Connecting lasting simple circuits and get to know the basics of soldering
- Strengthening fine motor skills and craftsmanship
- Strengthening of self-confidence when working with practices from adult workplaces.

Material:

- Soldering iron
- Solder
- Third hand
- Pliers
- LED, motors, ...

Duration: 7 - 15 min per child

Presentation & End-of-Day-Reflection – 30 min

Each working group presents their state of making – other children can ask.
Reflection on what happened at Day 3. Informing about upcoming day.



Day 4

MONSTER LAB COUNCIL Start-of-the-Day – 15 min

Warm up, focus on schedule – what will happen today? Today is Monster Showtime!
Short intro in whats happening.

MONSTER SHOW BRIEFING – 30 min

Preparing notes with questions: everyone knows what is going to happen and what their role is - how can they present their monsters.

What is your monster's name?
What problem does your monster show?
What can your monster do? (all features are shown live)
How did you build your monster?

TESTING - Last Steps:- 60 min

Last steps finishing the monsters: technology testing: all monsters are finished and working

CLOSING ROUND (Feedback) – 30 min

The content of the project is completed - the educators receive valuable feedback.

Possible leading questions:

What did you like?

What was not so good?

What could be improved?

Are you confident with the result?



MONSTER-SHOW - a stage for our FUTURE MONSTERS! – 60 min


An important part of the FUTURE MONSTER LAB is a solemn finale. Whether only for the Lab members or for other children, parents, those interested in a stage show or an exhibition: all monsters should demonstrate once again their abilities and functions. Last but not least - the work of the team has to be celebrated.

Implementation:

It is helpful to present each monster with a small interview - the moderator could be filled by two children who are confident to do this and get a briefing

beforehand. However, this can also be done by an adult.

Possible interview questions:

What is your monster's name?

What problem does your monster show?

What can your monster do? (all features are shown live)

How did you build your monster?

Equipment (if the audience is big)

- stage / audience seating
- PA / Microphone + Speaker
- sound / music / playlist
- lights/ curtain