Makerspaces in Museums: Guidance and Resources
In this leaflet, we offer guidance for museums that are considering setting up makerspaces for the first time.

The guidance was developed from the MakEY project, which involved a number of museums across the world.

Drawing on the good practice that emerged, here we answer six simple questions:

What?
Why?
Where?
When?
How?
Which?
What (are makerspaces)?

Makerspaces are spaces in which people can design and make a range of artefacts using the tools and resources to hand. They offer opportunities for tinkering, making and playing with materials.

There is no definitive blueprint for a makerspace. They may be limited to the provision of resources that enable participants to engage in one or two activities, or they may offer access to an expansive range of materials and tools, including digital fabrication tools such as 3D printers and laser cutters.

Why (set up makerspaces)?

Maker workshops offer enable children to acquire valuable knowledge and skills across a range of areas, including science, technology, engineering and mathematics subjects (STEM), integrated with arts and humanities subjects (STEAM). In addition, makerspaces foster the development of transferable skills such as problem solving, collaboration and critical thinking. Makerspaces help build resilience through iteration and allow children to build self-efficacy through learner-driven experiences that empower them with tools/materials/decisions they may have never been trusted with before.

Makerspaces are also of value to museums themselves, as they attract children and families who may have not visited them previously, and enable them to extend their offerings by providing hands-on access to a variety of tools/materials. Makerspaces help to expand the definition of the word “museum” from a place for collections to be viewed and not touched to a place for exploration, discovery and hands-on experiences.
Where
(should makerspaces be offered in museums)?

Makerspaces can take the following forms: a dedicated space that is a permanent exhibit or classroom in the museum, a mobile space that serves as an outreach vehicle or a cart that changes locations within the museum itself, or a distributed space meaning there are aspects of a makerspace that exist in various areas and departments of the museum.

For more information and specific examples, see Makerspaces: Highlights of Select Literature¹ for more information.

When
(should makerspaces be offered in museums)?

This entirely depends on the schedules you have, of course and how your makerspace is physically set-up. Museum maker programming can span from after-school and weekend sessions to summer camps to school field trip offerings. Many museum spaces have permanent exhibits that are open to the public all of the time and require little to no staff time to run while others run workshops or classes lasting offered in the MakEY project in non-formal settings lasted up to two hours.

Some museums prefer to ask people to sign up to sessions, but in others, enabling people to drop in is felt to be a more flexible approach that suits families' needs.

The kinds of activities that can be undertaken in a makerspace are endless, limited only by our imaginations. In the ‘MakEY’ project, some simple yet appealing activities were offered as a starting point for work with children aged three to eight, and then museums developed these, introducing other activities that they devised themselves. The starter activities included:

• **Squishy circuits**
  making circuits with conductive Play-Doh.

• **Drawbots**
  creating robots that draw, using small motors.

• **Light-up drawings**
  enabling children to draw pictures in which circuits and LEDs could be embedded.

• **E-textiles**
  first sewing kits for children were adapted so that children could make fish out of felt, with eyes that lit up.

• **Lightshows**
  children made simple torches that could be used to create lightshows.

Guidance on all of these activities can be found on the MakEY project website as separate handouts.

It is important to note that these are only suggestions, offered as a means of enabling museums to begin this work. Once you are confident in this provision, the range of activities that can be undertaken is extensive, depending on the resources and the skills of the staff and volunteers that you already have in hand.
One of the key issues to consider is staffing. In many cities and towns, there are open-access makerspaces that are run by enthusiasts and, sometimes, volunteers. It is a good idea to reach out to these – sometimes known as ‘Fab Labs’ or ‘Hackspaces’ – to visit and ask as many questions as possible. The makerspace community generally is very open about their strategies, policies and programming. Ask your own staff if they have any skills or hobbies they might like to share (woodworking, sewing, etc.). If you live in a city or town with a college or university, get in touch to see if any students are interested in volunteering. Similarly, student teachers are often pleased to have opportunities to volunteer to work with children. Keep in mind that you would need to carry out the usual checks to ensure safeguarding for children.

If makerspaces are offered in museums that have collections, such as art and historic artefacts, then there is a great opportunity to relate the makerspace activities to the collections. Having children respond to a collection, using the objects as inspiration for their own tinkering and making, can encourage them to engage with the collection in greater depth.

You should undertake some risk assessment prior to running makerspaces. You need to have policies and procedures in place to ensure safe usage of any tool, and a plan if accidents happen.
If you are interested in offering some of the activities outlined above, then full details of the resources needed for these are included in the handouts on the MakEY website.

There are some general resources which are always useful to have at hand in a makerspace. These are listed below, along with some suggestions of where the more specialist materials might be accessed. This is not an exhaustive list, includes materials found useful in the MakEY project.

It is also useful to collect material that can be recycled in makerspaces, such as cardboard boxes, cartons, bottles and so on. You may be fortunate enough to be located near to a scrap store centre, which will always have materials that are of value in makerspaces. It is worth identifying if there are local businesses who might be willing to pass on material that they no longer need, but which would be of value in a makerspace.

Which (resources do we need)?
Useful makerspace resources

Art and craft materials
- Paper
- Pens/ pencils
- Stickers
- Stencils
- Sewing kits
- Sellotape
- String
- Masking tape
- Double-sided masking tape
- Lollipop sticks
- Pipe cleaners
- Play Doh
- Embossing foil
- Coloured cellophane
- Fabric swatches
- Feathers, buttons, sponge shapes, and so on.

Tools
- Scissors
- Hot glue guns (Low-temperature versions can be purchased when working with very young children)
- Needle nose pliers
- Zip Snip or CANARY cardboard scissors
- Wire cutters

Electronic materials
A useful source for these is Kitronik: www.kitronik.co.uk
- LEDs (10mm, as these are easier for young children to handle)
- Battery packs (please note - these are preferable to coin batteries when working with young children because of health and safety reasons)
- Batteries
- Crocodile clips
- Resistors

Maker materials
A useful source for these is Pimoroni: shop.pimoroni.com
- BBC Microbits
- Copper tape
- Chibitronics stickers
- Conductive paint
- 3D pens
- Makey Makey kit

Useful apps
- Green Screen by Do Ink (enables the creation of green screen films)
- iMotion (enables the creation of simple animated films)
- Pablo (enables the creation of lightshows)
- Stikbot (enables the creation of stop motion animations)
- Qlone (enables the creation of 3D digital designs from 2D work)
- YouDoodle (enables children to redesign existing work)
Further information and resources:

Bay Area Museum Fab Lab, USA
https://bayareadiscoverymuseum.org/exhibits/fab-lab

Eureka, UK
https://www.eureka.org.uk

University of Cambridge Museums
https://www.museums.cam.ac.uk/blog/2018/10/19/creativity-experimentation-digital-making/

Lawrence Hall of Science, Berkley, USA
https://www.lawrencehallofscience.org

Museums Sheffield, UK
http://www.museums-sheffield.org.uk

Norwegian Museum of Science and Technology, Norway

The Tech Museum of Innovation, USA
https://www.thetech.org

Further information on makerspaces in museums:

Make: Shift: Do
https://www.craftscouncil.org.uk/what-we-do/makeshiftdo

Making + Learning
https://makingandlearning.squarespace.com

Youth Makerspace Playbook
https://makered.org/makerspaces/

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