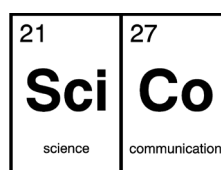


Equipment, Tools, Materials and Safety



OPEN SCIENCE HUB
**SCICO
MAKER LAB**
GREECE



The current document depicts the basic materials, tools and equipment found in the SciCo Maker Labs. The first SciCo Maker Lab was established in the secondary school of Livadochori Limnos and was then reapplied to the Vocational School of Myrina.

The document also states the basic safety points which need to be taken into consideration by all participants and visitors of the Maker Space.

1. Workspace

The SciCo MakerLab was created as part of the European Project Open Science Hub and was first set up in the existing computer lab of the Livadochori High School in Limnos, Greece. It was then reapplied to the Vocational School of Myrina in Limnos.

The goal is to ensure a safe, comfortable and creative maker space for students within and outside school hours, by individuals and teams. Therefore, it has been created in order to have individual work desks, a common workspace in the centre of the room and enough space for people to move around freely, without danger.



2. General Workspace Safety

Initially, users should always ensure that:

- Pathways, exits and safety equipment are kept clear from tools, materials, furniture and equipment.
- The trash and debris should be removed regularly.
- The room should be lighted and ventilated adequately.
- Everyone should know where the first aid kits and fire extinguishers are.
- Safety goggles and gloves are worn when needed.

The remaining general safety procedures (eg, fire escape plan, earthquake “Drop-Cover-Hold” plan, etc) are common to the schools’ safety procedures.

3. Inventory

The workspace needs to be organized and spacious enough to provide enough room to move around working makers freely and without danger. We have fire extinguishers, safety paths and signs, adequate lighting, and ventilation. The Fab Lab set up was verified and approved by local authorities for safety at work.

SAFETY TOOLS / EQUIPMENT / MATERIALS PER SPACE	QUANTITY
Fire Extinguisher	1
First Aid kit	1
Safety Goggles	5
Gloves	2
Containers	6
Broom and dust pan	1
Rubbish Bin	1

GENERAL PROJECT TOOLS / EQUIPMENT / MATERIALS PER SPACE	QUANTITY
Scissors	10
Hot Glue Guns	5
Hot Glue sticks	30
Sets of Rulers, Glue, Staplers, etc	5

Sets of pens, paper, pencils, crayons, etc	5
Tape (duct tape, masking tape, copper tape, etc)	10
Paintbrushes and Paint	10
Cardboard	50
Popsicle sticks	100
Pipe cleaners	100



4. Computers

Personal computers (pc) are at the core of Scico Maker Lab, as there are used by students to:

- Access information and get inspiration.
- Access digital tools to design, create, and collaborate on projects.
- Programme and write code for their projects.
- Connect to 3D and normal printers to produce patterns, designs, project materials and mock-ups.
- Access tutorials, instructional videos.
- Document projects and learning.
- Connect via online platforms.
- Share projects and communicate work.

All computers run in a Windows or Linux environment and all software used are open accessible educational platforms, such as Tinkercad, Wordpress and App Inventor by MIT.



Computer Safety

Students should be aware of basic ergonomics at their workstations: correct posture and lighting and frequent breaks away from the screen. Additionally, students are trained in order to access age and content appropriate webpages and never disclose personal information (photos, name/surname, phone number, passwords, school, etc).

Inventory

TOOL / EQUIPMENT / MATERIALS	QUANTITY
Desktop computers	10
Printer	1
Laptop	1
Projector	1

5. Electronics

One of the basic tools used during the current academic year are microcontrollers (Arduino) and robotics kits (Lego Education). The former are used in order to introduce students to electricity, electronics, electric circuits, basic programming with ArduBlock and physical computing, whereas the latter include both Lego WeDo 2.0 and Lego EV3 kits, in order to introduce students to basic coding, robotics and building.

Microcontrollers & Robotics Microcontrollers allow makers to create advanced electronics and electromechanical systems including robots. This adds the capability to build and experiment with robotics, microcontrollers, and other electromechanical creations.

Apart from the basic Robotic kits and Microcontrollers (Arduino), SciCo MakerLab includes a range of sensors, electric cables, soldering irons, batteries, breadboards, usb cables, LEDs, Bluetooth connectors, copper tape and other materials which are needed to build the projects.



Electronics Safety

All electronic equipment is low-power and safe, however students are introduced to the basics of a short-circuit and safe handling of all tools.

The tip of a soldering iron heats to about 400°F, hot enough to cause burns and should be handled attentively. Under normal soldering conditions, solder containing lead poses no health risk, though makers should be encouraged to wash their hands after a long period of handling leaded solder. Any kind of soldering generates fumes from the flux core of the solder, so the area is ventilated when used. Alternatively, students mostly use solderless breadboards as they can explore circuits in a faster and safer way.

Inventory

TOOL / EQUIPMENT / MATERIALS	QUANTITY
Arduino Microcontrollers	60
Lego Education WeDo 2.0	4
Lego Education EV3	3
Soldering Irons	5
Sensors (temperature, pressure, CO ₂ , O ₃ , weight, distance, sound, etc)	100
Breadboards	20
Batteries (AA, 9V)	20
Jumper Cables	200
LEDs	100
Raspberry pi	20
Motors	10
Photoresistors	40
Resistors	100
Buzzers	10
Coin Batteries	10

6. 3D Printer

The SciCo Maker Lab is equipped with a MakerBot Sketch 3D Printer, with which students can print 3D objects from plastic through extrusion. The material used in this printer is PLA (a biodegradable plastic), whereas students create their 3D designs using the Tinkercad or Autodesk platform. They also have the option of searching from ready designs and freely downloading them from sites like Thingiverse.com.

The set up of the printer and basic training was run in collaboration with the provider (Decode Fabrication Lab), who is also responsible for its maintenance.

As an easy and quick activity to introduce students to 3D printing, the Maker Spaces were also equipped with 3D pens. These pens can also be used for mini creations for projects.

The second school already had a 3D printer, which was used in the Maker Lab.



3D Printer Safety

3D printers are generally very safe. The print extruder does heat to several hundred degrees and should not be touched.

Inventory

TOOL / EQUIPMENT / MATERIALS MATERIALS PER SPACE	QUANTITY
3D Printer	1
PLA Spools	6
Build Plates	2
Snip	1
USB for transferring files	1
3D pens	5