

officina degli errori

A TINKERING EXPERIENCE IN AN INFORMAL ENVIRONMENT

OUR LABORATORIES

Scribbling Machine design and build a robot that scribble using a servo motor, batteries, recycled cardboards, plastic and tons of material to decorate.

Paper Circuits build a circuit on paper that light up a constellation and design their own piece of art where the drawing is lighted up by a led.

Chain Reaction is about the relationship between cause and effect; starting from the materials' selection, kids work together to reach a result, learning to observe, sharing ideas, trying to solve appearing problems via trial and error. They basically build a giant and sophisticated domino with mechanical and electric interaction in a cooperative and playful way.

Paper Automata is very much related to museum's collection. Kids design a storytelling animated by paper and rubber wheels, inspired by a visit at the museum. During the visit they experienced and played with real gears coming from industrial machineries.

WHAT IS TINKERING

“ a deeply human endeavor based on direct experience (knowledge is constructed while a physical object takes form) not a set curriculum equal parts play and inquiry not linear (but) it is cumulative ”

The Tinkering Studio-Exploratorium
Karen Wilkinson - Mike Petrich
<https://tinkering.exploratorium.edu/>

Sara Ricciardi, sara.ricciardi@inaf.it, **Fabrizio Villa**, **Matteo Boni**, **Sara Venturi**
INAF-OAS, Osservatorio di Astrofisica e Scienza dello Spazio di Bologna, Italy

Stefano Rini stefano.rini@ic12bo.istruzioneer.it
IC12 Istituto Comprensivo 12 Bologna, Italy

Miriam Masini, masini@comune.bologna.it, **Annalisa Bugini**
Museo del Patrimonio Industriale, Bologna, Italy

Since 2012 we have been working together with teachers to design, promote and deliver hands-on, self-directed and playful activities to engage children with STEM. The most powerful method we used is tinkering, which is a holistic way to engage people with STEM disciplines mixing them with art and combining hi-tech material with low-tech and recycled material. Knowledge is not simply transmitted from teacher to learner, but actively constructed by the mind (and the hands) of the learner.

Constructionism (Papert 1980) suggested that learners are more likely to develop new insights and understandings while actively engaged in making an external artifact. This method supports the **construction of knowledge** within the context of building personally meaningful artifacts, and the more self-directed the work is, the more meaningful the learning becomes. From 2014 we proposed to the pupils of our local community several workshops based on the activities originally developed by the Tinkering Studio.

Our labs are now mature and ready to be brought in a larger arena. For this reason, in the past months (Oct-Dec 2017) we brought tinkering into the Museo del Patrimonio Industriale (PAT) in Bologna under the name of "Officina degli Errori", a set of 4 tinkering activities in this informal environment.

We engaged a group of 20 kids, from 6 to 12 years old, during 4 workshops held on Saturday afternoon in the conference area of the museum. We expect this successful test will open a new branch of activities in this museum that is already offering STEM activities to the pupils in the Bologna area.

These experiences are democratically free of charge. Our idea is to offer a tinkering lab and a learning opportunity to the pupils, a fruitful form of training to the teachers and some guidance in the collection of materials.

WHY PAT

Because it is an inclusive space in our territory. A place where all kids can discover STEM with their peers. Where to design and operate a truly inclusive classroom workshop without gender and social gap. PAT has already a strong connection with the schools of our area.

WHAT'S NEXT

we are looking to offer a tinkering-experience at the museum for primary school teachers and kids. The teachers will be engaged by a series of workshops on constructionism, facilitation and inclusion. We will also help teachers to collect and build their own material. They will test those strategies in their class at the museum with our support. Our hope is that this project will be a viable seed in many classrooms of our local community.

