Number of participants: 25
Ages: 12 to 16 years old.
Instructor Team: 1 Student instructor per day + 4 students assistants (College students)

Sewing

Brief Description: Sewing is one of the oldest manufacturing processes of mankind. The methods have changed, but the principle remains the same: the union of pieces of cloth by means of thread. This workshop seeks to make this concept visible in the lives of students, teaching them the sewing process to encourage creativity in the manufacture of textile pieces.

EXPECTED LEARNING:
To learn the process of making a basic shirt through the use of a sewing machine.

SPECIFIC EXPECTED LEARNINGS:
- Know the basic functions of the sewing machine.

- Know the standard manufacturing process of any textile product.

- Tear down stereotypes and myths associated with sewing.

- Know the scope of sewing.

- Valorize the textile process.

MATERIALS:
- 10 sewing machines
- 10 threads
- 15 individual machine needles
- 4 double machine needles
- 10 individual needles
- 5m. fabric Jersey Blue, Red
- 6m Jersey fabric in Yellow, Green and Purple.
- 20-30 cm. Fabric for fist for each color.
- 23 pin set
- 23 Bookmarks
- Molds (14-16-S-M-L / man-woman). Have the molds cut.
- 23 scissors
- Studs
- Accounts
- Fabric paint
- Brushes

ESTIMATED TIME:
Total workshop time
2.5 hours

Things that should be done before:
Leave the threads below ready
Cutting molds
Cut fabrics

Time / Activity / Space	Description	Student instructor / Assistants	Kids / Youth
Theory: Sewing Concept Total time: 25’	- Short sewing history -Steps in textile production and the sewing process - Sewing = patience	Material must be prepared in a different physical space	Participants are listening and asking/answering questions

Theory: Shirt Total time: 15’	- Presentation of the materials -Explain the process in detail for the preparation of the shirt. 1. Position the fabric 2. Mark the chosen mold with fabric 3. Cut the fabric 4. Join the parts with thread and needle, leave the shirt ready. 5. Join it in the machine, cut what is left over. -Explain the care that must be taken with the machine. 1. Gently squeeze the pedal 2. Put your hands on the side of the fabric. NEVER facing 3. Having the space always organized	Leave fabrics, threads, needles, fabric scissors and markers per group.	Students do not start until they have finished the instructions.

Practice: Cut Total time: 15’	The students: - Locate the molds on the fabric and mark it with a marker. Take into consideration which ones are repeated and which ones are not. - Cut out the demarcated molds	Help students Prepare the machines.	

Practice: Union, darning Total time: 60’	Darn the shirt They must join the whole shirt with sewing, this does not have to be perfect. 1. Shoulders 2. Sides 3. Neck 4. Sleeves Pass it through the machine	- Instructor and two assistants will supervise the use of the machines. - An assistant will help the groups.	

Practice: Finishing Total time: 30’	Darning finishes	- Supervise the use of the machines.	Start cleaning up

Closing: Reflect on the day Total time: 20’	They look at all the shirts. The students say difficulties and limitations they found in the making. Show video of some solution through the confection.	Questions - What is the part that cost you the most? What did they learn, not only technical, but some other acquired capacity? What are they capable of doing now?	

2D Modeling

EXPECTED LEARNING:
Learn 2D modeling and computational design tool.

SPECIFIC EXPECTED LEARNINGS:
- Know the spatial dimensions.
- Know the design process in 2 dimensions.
- Learn to use Inkscape.
- Know different file types and key concepts of 2D modeling
- Know the 2D manufacturing machines and their operation.

MATERIALS:
- Projector
- Computers
- Paper
- Markers
- Object to design. (It can be from a phone to a pencil)
- Pencils
- Ruler
- Vinyl
- Color printer
- Scanner
- Maps
- Glue

ESTIMATED TIME:
Total workshop time 6 hours with breaks

THINGS THAT SHOULD BE PREPARED IN ADVANCE:
- Paper Crafts
- Install Inkscape in computers

PROGRAMS:
- Inkscape

Time Activity	Description	Student instructor / Assistants	Kids / Youth
Theory: 2D Modelling Total time: 40’	The concept of dimension is defined and exemplified - 2D modeling and a small historical review are detailed. -The uses of 2D modeling and its importance in representation are explained. - The concept of isometric views of a 3D object is defined. -The challenge of the day is presented.	Two instructors prepare materials: Pencils, rubber and ruler.	-Students will be seated each at their place observing the presentation. -
Practice: Made a 2D model by hand	Students must draw an object on a paper.	Distribute materials. Help students who have problems with exercise.	-The students must measure the object they chose (a cell phone, a pencil, a key) and draw the lines on a sheet that will be given to them. They should do it with pencil.
Practice Theory: Inkscape. Total Time: 60’	-The instructor introduces the program Inkscape, a video of the scope of the program is shown. -The interface and key concepts are presented. -To learn its use, a scene will be created where fungi and background will be selected.		Children will follow the steps to then explore more possibilities of the program.
Practice Theory: Logo in paper Total Time: 60’	First the concept of logo is introduced. The appreciations that they have of the concept are collected. Then the idea is to make a logo per team. First a brainstorm is held among all, then it is drawn, then scan it and trace it in Inkscape. The logo must be drawn with colors, as if it were the real one, so that at the moment of tracing on the computer everyone does the same.	They should help all participants. An assistant scans the logo.	They should sit as a team to discuss the logo

	Once they have been decided, the guide will be in the scanner and will scan the logos.		
Practice: Logo in computer Total time: 60´	The instructor shows step by step how a logo is build. Once the students are on their way they are left alone working on teams.	Instructor and assistant help participants with the program.	Each student is working on a computer drawing their own version of the team logo.
Theory: 2D machines at FabLab Total time: 60´	The three machines that are in the FabLab are introduced and their operation -CNC -Cutting plotter -Laser cutter Students visit the machines.	Give an account of the precautions that must be taken with the machines. Why are they 2D?	

3D Modelling

EXPECTED LEARNING:
Know the scope and importance of the 3D world, specifically 3D modeling focused on product manufacturing.

SPECIFIC EXPECTED LEARNINGS:
- Become familiar with the 3D world and its scope.
- Learn Tinkercad program
- Understand 3D scanning through practice.
- Make a 3D mold in resin.

MATERIALS:
- Projector
- Computers
- 3d printers
- 3D Scanner
- Piece of mesh
- 1 Kilogram of Resin for every 5 students
- 3 Bottles of hardener
- Containers for resin mixing
- Tablecloths
- Mold
- Bathroom silicone
- Acrylic
- Containers for mixing silicone
- Gloves

MODEL:
- Industrial plasticine
- Printed figure or toy of 5 cm approx.

ESTIMATED TIME:
Total workshop time 6 hours with breaks

THINGS THAT SHOULD BE PREPARED:
- Samples of 3D printers.
- 3D scanner instructions.
- Make the steps to show the replica of the figurine (figurine in plasticine, mold in silicone, and figurine in resin)

PROGRAMS:
- Autocad Tinkercad
- Makerbot Desktop
- Thingiverse
- Grabcad
- Sketchfab

Time / Activity	Description	Student instructor / Assistants	Kids / Youth
Theory: Introduction to 3D modelling Total time: 20’	- Representation of the 3D world (triangles and quadrilaterals). - Applications that use 3D modeling. - Technical terms are taught. - Presentation of 3D libraries		

Practice: Guided 3D modeling activity Total time: 30’	At this point a guided 3D modeling activity is done. The students follow the process on their own computers. The idea of this is to show you the different functions of the Tinkercad program and the libraries. The instructor explains step by step how is the process to download an object and import it into the program that will be used. Preparation of the file to be printed in the MakerBot program, commands, and instructions to follow to achieve the expected result. Finally, the instructor sends the figure to be printed and the students see the machine working.	The assistants walk around the room solving doubts and making sure that the students follow the activity	

Theory: 3D Scanner. Total time: 40 '	>> Explanation of 3D scanning. >> Laser Explanation. >> Video: https://www.youtube.com/watch?v=SyzgBycPxyw (0:52 to 1:28, 1:44 to 2:10) WITHOUT SOUND		

	Video: https://www.youtube.com/watch?v=AYq5n7jwe40 (2:38 a 3:04) >> Explanation Photogrammetry. >>Explain step by step the 3D scanner		

Practice: 3D Scanner / Free 3D Modeling Activity Total time: 120 '	The goal is for students to scan their torso with the Sense 3D scanner. For this they will work with their groups.	Two assistants will be supporting the 3D modeling activity.	

Theory: 3D replication through molds Total time: 20 '	Alternatives when making a product and its different pieces, making it clear that the most used is the mold process. Explain virtues of the molds and name with specific examples in what industry or product known by them this process is applied. The most important PATIENCE! and prolixity. Something they do wrong in the first stage will have consequences in the last one.		

Practice: Figure in plasticine Total time: 60 '	You begin to model a figure in plasticine. Make clear what industrial plasticine is and that it is modeled almost like a regular plasticine. Show the technique of starting from a cube to model or from a sphere.		

Practice: Silicone mold Total time: 30 '	Once all the students have their figure ready, the instructor begins to demonstrate in a practical way how to start making the mold.	Instructor and assistant help in that all the students are left tidy work (not to generate disappointment in their finished molds) Make sure that the molds are well closed.	

Theory: Materials and processes of making figures with molds. Total time: 40 '	While the molds are drying, the theory of how the figures are made once the mold is made is introduced. They also name different materials that can be used for this and how these materials are worked (Usually two parts are mixed and it is expected to catalyze).		

Practice: Rigidity and casting of the mold Total time: 60 '	Explanation on how is the process of rigidity mold, this is done in a practical and expository way. Once the molds are dry, the process of mixing the resin with the measurements and techniques is reviewed. Later, the molds are filled.		

Video Editing

EXPECTED LEARNING:
Understand a production process film editing.

SPECIFIC EXPECTED LEARNINGS:
- Know the relevant technical aspects of the image and video.
- Learn about video capture technologies.
- Understand and apply the process from the conception of a cinematographic piece to post production.
- Give value to the importance of communicating an idea through the video.
- Realize that technology is not an impediment to making a good video

MATERIALS:
- 5 cameras or cell phones
- Elements for filming (masks, toy guns, wigs ...). It can be anticipated that we will do it and that the children will bring it.
- Storyboard sheets
- Cards with micro-stories
- Green fabric
- One flipchart per group
- Downloaded

ESTIMATED TIME:
Total workshop time
6 hours with breaks

THINGS THAT SHOULD BE PREPARED:
- Chroma key pluggin
- Make a short
- Make storyboard sheets. PROGRAMS:
- Windows Movie Maker

Space layout:
The workshop is divided into several parts.
-Theory of image and video is done through an interactive expository class where students observe from their jobs. No special provision is required in the FabLab.
-Introduction to Adobe After Effects requires a computer room with one computer per student.
-Planning the scenes is done in a comfortable place where all the participants can be comfortably talking with their colleagues and with a table where they can write the storyboard.
- Video editing must be done in the computer room.
-The final presentations are made in the FabLab space in the main projector.

Time / Activity /	Description	Student instructor / Assistants	Kids / Youth
Theory: Image and video Total time: 9:20 (80 ')	A brief reference is made to the historical evolution and how technology has improved. A contrast is made, both in quality, technology and terminology. Students should be alluded to with questions like Do you know what television means to be HD, or UltraHD? Video: some old movie and another new one. The current technology and the operation of the cameras are discussed. Differences between camera types. Laptops, Reflex, Video. How a video is composed No matter the technology you can always make good videos. Find examples of videos with a cell phone. It explains very simply what is the narrative, how ideas are communicated visually (eg highlight something). Narrative concepts (script, storyboard). And the importance of film planning.		

Practice: Chroma Total time: 10:40 (60 ')	The first activity of the day will be chroma. First the technology is introduced, it explains what it is for and how easy it is to do it. By groups, you first choose a place that you want to recreate and as they are ready record in the green background. Once they are all ready, the instructor shows how to ride step by step. https://www.youtube.com/watch?v=WAVtv7G6v1s)	The assistants and instructor help to record in the green background.	

Theory: Workshop of the day Total time: 30 '	The objective is that they can produce a short film, from its planning to its post-production. The latter is complemented by the presentation of the parts and subprocesses of filming a film: The theme of their shorts will be previously defined and will be drawn. In addition the short must have at least one scene for each member of the group and a duration of 3 minutes -The main factors to make a good video are analyzed.	The assistants go helping the groups that require it.	

Practice: Movie Maker Tutorial Total time: 12:10 (50 ')	The Windows Movie Maker edition software is introduced. The interface is presented. Students will learn to perform a series of effects step by step with the instructor. Comments are made on tips for filming that help the effects go well. [Lighting (shadows), dimensions, velocities of objects, stable shots]		

Practice: Script Total time: 14:00 (40 ')	Brainstorm the script and creating a storyboard. Emphasize the importance of this process. Define roles, as in a film company (can be interchangeable) -Director - Cameraman -Actors	Give the students a flipchart and pencils to create and discuss the script. Try to make everyone participate. Pass the storyboard sheets.	

Practice: Shooting Total time: 90 '	Filming process	Help the students to film.	

Practice: Edition Total time: (until the end of the workshop)	Editing process Each student will edit a scene and then put them all together.		

Tools and materials

EXPECTED LEARNING:
Know different materials used in the manufacture of products, along with their strengths and weaknesses. On the other hand, know tools, their functions and security measures associated with their use. All this through the making of a spear water. SPECIFIC EXPECTED LEARNINGS:
- Know and distinguish materials in terms of use and work techniques.
- Understand the use of tools and their precautions
- To demolish myths or misunderstandings when using tools, for example the types of drill or saw vs. saw.
- Plan all the necessary aspects to perform some operation with the tools (what I need before, during and after use).

MATERIALS:
- Projector and computer
- Block of natural wood, compact (MDF), metal sheets and tubes, wire, PVC tubes, PAI sheet, resin, plaster, silicone Two pieces of dimensions not exceeding 15 cm in any direction. Cayman, press C, table press if possible, normal and pedestal drill, saw, saw, wood drill, metal and concrete, safety suit, goggles, jigsaw, planer, screws, nails and bolts and nuts.

- PVC pipes of different sizes
- PVC glue
- Ball valves (inflation needles are needed) or bicycle

- Bowlers
- Painting
- Plastic bottles
- Rules
- Pencils
- Leaves

ESTIMATED TIME:
Total workshop time
6 hours with breaks

Time / Activity /	Description	Student instructor / Assistants	Kids / Youth
Theory: materials Total time: 10:20 (20 ')	- A review is made of the different types of materials and some of the most relevant characteristics of them (virtues and defects). A sample of the material and its variants is passed according to the form or technique with which one works. It is also named for what type of pieces or products is recommended to use, with what techniques you work and why.		

Practice: Know your tool Total time: 10:40 (40 ')	The activity is explained to the students, this consists of the teacher in the projector delivering a challenge or a question to the students, and they must answer as detailed as possible how they will solve this. It ends with a practical demonstration of the whole process so they can see how the machines work.		

Theory: Water sprays and pressure	Manufacture of a water spray. The operation of the water spray and the effect produced by a piston is presented. What is pressure versus		

pump concept. Total time: 11:20 (20 ')	what is force. Why do we get hurt easily if we put a needle in the finger but if we apply the same force with a larger object we do not hurt ourselves? How a pressure pump works Show example of firefighters		

Practice: Manufacture of a water spear. (sketch) Total time: 12:00 (60 ')	The students go to the terrace or patio where the assistants are waiting. - Two or three water spear designs are presented and their parts explained. This is done in the yard to show functionality. - Design 1: The advantage of this model is that it allows agility and speed. https://www.youtube.com/watch?v=xjWV_a3Jrcs -Design 2: the advantage is the control over the shot since it does not depend on your strength. http://www.sscentral.org/homemade/aph/ -Design 3: It is similar to 2 but the water tank goes on the back of the person.		

Practice: Manufacture of a water spear. (model) Total time: 14:00 (150 ')	what was done in the sketch is carried out. It is explained that there are two zones: tools and gluing. The idea is that they can work in a freer way than the other days. With their own times. The independent functioning of the students should be observed.		

Programming

EXPECTED LEARNING:
Achieve developing programming projects with Scratch.

SPECIFIC EXPECTED LEARNINGS:
- Develop algorithmic thinking.
- Learn to use the Scratch page and its tools.
- Steps to follow for the creation of a game with block programming.
- Develop critical thinking (search for tools by themselves).

MATERIALS:
- Data and 24 computers.
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- Blocker
- Swimwear
- Towel

ESTIMATED TIME:
Total workshop time 6 hours with breaks

PROGRAMS:
- Scratch offline

Time / Activity /	Description	Student instructor / Assistants	Kids / Youth
Theory: Introduction to programming Total time: 40	Explain the scope of programming, show different examples - Algorithm + Programming language = Computer program - What is an algorithm?		

Theory: Introduction to Scratch Total time: 30 '	- Explain what Scratch is (a program with which you can create: games, animations and stories and share them online for free). - The goal of Scratch. - Explain that the mode of use is not through visible codes but through block programming.		Students must have open scratch on their computers and start with the first scans. .

Practice: The game Flappy fish Total time: 150 '	- Through the creation of a game they will learn the program. It will be a guided activity, but always through participatory teaching. - The game Flappy fish is like the original game Flappy bird, but it is a fish in the sea that must endure in time dodging its enemies. - The students will be explained how to completely create the game, that is, where to get the images and edit them (all this with scratch) as well as the programming blocks that should be used. (The idea is that it is interactive so the blocks of the algorithm will not be dictated completely by the instructor, but the students also participate in the creation).		

Practice: Create a game	Apply everything you have learned to create a simple game of your own choice (from a list).		

Practice: Socialization of the game	Students should share their game with classmates. To then meet and make an evaluation of own games and those of others. They will also be asked what they think are the scope of the programming and what areas they would like to explore from the programming.		

Electronics day 1

EXPECTED LEARNING:
Know aspects of electricity and electronics.

SPECIFIC EXPECTED LEARNINGS:
- Understand what electricity is, what it is used for, how it is used and its scope
- Understand an electrical circuit
-Ohm's law
- Learn to solder tin
- Understand programming applied to electronics

MATERIALS:
- 10 Multitester
- 25 Battery connectors
- 50 Leds
- Telephone cable and / or jumpers (400 to 500)
- 10 Wire Strippers
- Resistances:
- 25x ~ 500ohm
- 25x ~ 15ohm
- Capacitors
- 25x 30microF or more
- 25x 9v battery
- rechargeable battery> 5v and <12v
- Arduino cable
- Arduino one
- protoboard
- bluetooth module hc-06 (slave)
- bridge h l298n
- two-wheel automobile kit two conversion box + idler wheel

ESTIMATED TIME:
Total workshop time 6 hours with breaks

Time / Activity /	Description	Student instructor / Assistants	Kids / Youth
Theory: Electricity Total time: 40 '	What is electricity? (What it's for, where it comes from, how it works, dangers) Where is the electricity? How is it generated? Why should you be careful when handling electricity? (Burns) Why do not I get electrocuted with a battery? Why on the plug if I get electrocuted? Why can birds stand on cables without being electrocuted? Concepts: An intension (Voltage) One way (Resistance) One Amount of current (Current strength) Explanation of Ohm's Law.		

Practice: Simple Circuit Total time: 20 '	A closed circuit will be built following the instructions, without a protoboard, to stimulate curiosity and to ask questions after the recess. The circuit consists of a led, a battery, and a resistor.		

Theory: Electrical components Total time: 10:45 (60 ')	Concepts: (show Images of each concept) Gif of circuit operation (Switch) If any part of the circuit is disconnected, the LED stops lighting. (Cable) The path we have made is wire. The wire is a good conductor. (Battery) Delivers the voltage jump so that the electrons want to go from one side to the other.		

	(Chemical reaction) (Resistance) Device that has that name because its function is to increase in a controlled way the resistance of the road. (Led) Transforms the energy of the electrons into light (you can only do it with a maximum of 40mA). This device is also driver in only one direction. Condenser. Students will now charge the capacitor with the battery and put it on the circuit to see how it is discharged. The condenser is explained.		

Practice: The disarmament Total time: 75 '	The students will have to disarm a series of electrical objects and find out how they work.		

Theory: Introduction to Arduino Total time: 14:00 (30 ')	Students will learn what an arduino is and basically how it works. (Microcontroller, pins, serial communication). The operation of the arduino digital pins and the serial communication will be briefly explained. Students will open the arduino IDE, to learn the basics of arduino programming. The image of a breadboard will be shown and its operation will be briefly explained It will be explained that different components can be used in conjunction with the board, such as LED lights, buttons, a module to provide wireless communication and a		

	circuit to control the direction of rotation of DC motors. Photos of the components will be shown and their operation explained.		

Practice: Autito controlled by smartphone Total time: 120 '	Students will build a car that will be controlled through their smartphones, for this they will be instructed how to load a ready-made code to their arduino boards. Then they will be shown the components to be used and an image where a schematic will appear with the connections they must make between the motors, the bridge h and the power source.		

Game: Car race Total time: 30 '	With their cars already prepared, students will participate in a car race.		

Electronics day 2

EXPECTED LEARNING:
Learning in general: Consolidate the knowledge of the workshops "Electronics I" and "2D Modeling", and develop skills in the use of tools and materials.

SPECIFIC EXPECTED LEARNINGS:
- Know the nature of sound, with an electrical base.
- Identification of electrical parts and their functionality
- Understanding the flow of an electrical system.

MATERIALS:
- Data
- Electronic components******
- Cut pieces of MDF 3mm
- Silicone tube or cold glue.
- Screws *

- Leaves
- Pencils
- Extenders
- Soldering tin
- Paper
- Pencils

ESTIMATED TIME:
Total workshop time 6 hours with breaks

THINGS THAT SHOULD BE PREPARED:
- Cut pieces of MDF
- A speaker PROGRAMS:

Time / Activity /	Description	Student instructor / Assistants	Kids / Youth
Theory: Sound and electricity. Total time: 40 '	How can sound travel through cables? Can one electrocute with sound? How does a stack sound? The physical concept of sound is defined and it is deepened with experiments and videos. Video: Talking in motion Experiment: Connecting a speaker to a 9V battery. The circuit is made with an 8ohm speaker and a minimum resistance of 150ohm in parallel (0.5W). With the experiment it is appreciated that the speaker moves in one direction or another depending on the connection direction of the battery. Then the circuit manufactured the previous day is connected to see the frequencies. Practical data of the sound devices are explained. Sourround, Stereophonic or Monophonic. The concept of energy transformation (Power) is explained		They do the experiment in pairs, it is expected surprise and doubts about it.

Instruction: Portable Speaker Construction Total time: 10 '	The instructor explains the challenge of the day and shows the final result with a finished portable speaker. -It explains what they should do: construction of the circuit and construction of the housing. - Questions are answered.		

Practice: Amplifier Design Total time: 20 '	- The amplifier parts are explained in a generic way: -Power source -Amplifier -Entry sound -Sound output -Cables -Switch -Led of ignition -The students should discuss the way in which parts of the circuit should be connected -Finally draw on a sheet the circuit, identifying its parts with squares that are interconnected. -The students choose a representative that will explain what they are going to build.		

Theory: Circuit Connections and Components Total time: 40 '	- The instructor explains the components that will be used in the circuit: -LM386 Its functionality is explained and the datasheet is shown, emphasizing the pin diagram. -Resistences -Condensadores. -9V battery -Plug Stereo:		Students will recognize similarities and differences with the previous day's circuit. The concept of "datasheet" or data sheet will be a little closer for them.

	-The general connection diagram is shown and the earth is identified. The flow of the sound signal must be followed.		

Practice: Circuit Construction Total time: 2hrs 30 min '	-The students will weld all the pieces of the circuit, following the steps of the instructor. One slide per piece. -It is important that after each piece the correct connection with a multi-tester is verified. The speaker should be tested and in case of malfunction, the assistants should check connections.		

Practice: Armed Housing and Circuit Installation. Total time: 105 '	Students must assemble the casing with the pieces of MDF and must verify the correct installation of the parts of the circuit The circuit is placed inside its housing and the final tests are made.		

Practice *: Personalization	Students have time to personalize their speakers freely. Some ideas can be: make a handle, cover it with vinyl, put their names.		It is expected that students who finish earlier will have more time to personalize their speaker.