5.3.2 Context specific (Fab Lab / Makerspace / Workshop)

SESSION TITLE

Make your own kite

ACTIVITY IN A SENTENCE:

Discover air and its properties and learn how to make your own kite with recycled materials and tools in a Fab Lab.

DISCIPLINES INVOLVED IN ACTIVITIES:

Physics, Technology, Tinkering

RECOMMENDED AGES:

9+

LEARNING ENVIRONMENT (CONTEXT SETTING):

Fab Lab / Third place

LEARNING OUTCOMES:

- Understand how a kite can fly
- Understand the role of air in human life
- Arouse wonder and curiosity to discover the world of kites
- Learn to stay focused on an activity
- Acquire tinkering skills in a Fab Lab and learn to use tools
- Develop creativity

RECOMMENDED EXPERTISE:

Facilitators will have experience in Fab Lab tinkering activities and will need to know how to use a sewing machine and a 3D printer.

SDG LINKS:

- **Goal 12:** Ensure sustainable consumption and production patterns

TIME IT TAKES TO COMPLETE:

Two sessions of 3 hours

MATERIALS / RESOURCES NEEDED:

- Wood sticks
- Scraps of fabric (polyester or nylon fabric is best)
- Material for decorating like sticker
- 5mm strips of wood
- Kite string
- Scissors
- Markers
- Connectors (may be printed using 3d printer, see content for learners)
- Sewing machine and if possible a vinyl cutter
- Handles for the kite string can be cut in advance or during the workshop using a laser cutter or a saw

CONTENT FOR LEARNERS:

Resources may be found *here*, including instruction for the prototype connector to be created with a 3D printer [French].

TIPS FOR SCALING FOR DIFFERENT AUDIENCES:

The workshops targets children of 9 years and older because of the need to handle tools. Therefore scaling down to reach a younger age group is not advised.

Activity

Introduction:
First session (180 min)

Part 1: Welcome (20 min)

Welcome the children to the workshop room and talk to them about what a Fab Lab is. Give a quick tour of the Fab Lab space and show how the 3D printer, vinyl cutter and laser cutter work (cut a handle and print a connector).

Establishing the children's pre-existing knowledge (10min)

Arouse the children's curiosity about air through questioning. This will help to identify their level of knowledge.

Some questions to ask:

- What is wind?
- Are wind and air the same thing?
- Can we touch the wind?
- Can we see the wind?
- Can we make wind?
- What objects can fly? How does technology mimic nature eg. planes vs birds?
- What everyday experiences allow us to perceive the existence of wind? What experiments can be done? What objects can be made?
- Air is everywhere around us. How can we notice it? How can we make it obvious?
- When the wind blows: Is it windy? How do you know?
- Is air important for human beings? Why is it important?

Part 2: Building a paper plane (10 min)

Carry out small experiments to introduce the subject and ask the children about it.

Make a paper plane fly. Ask questions: Why can the paper plane fly? What is the difference between air and wind? Let the pupils participate actively.

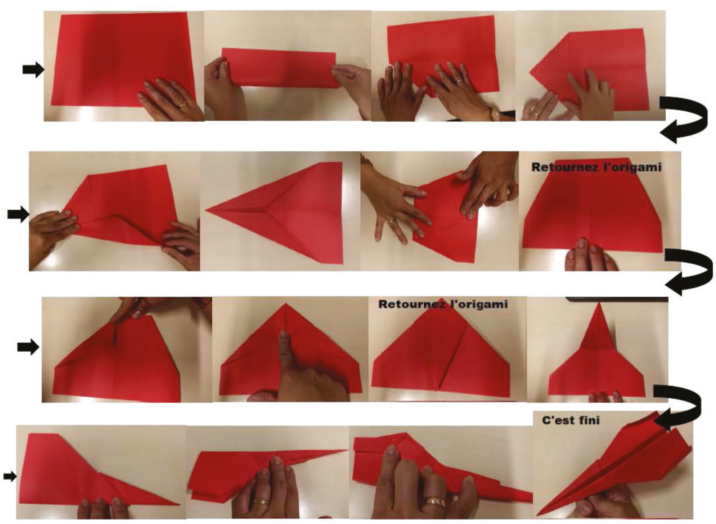

Figure 5.5: Step-by-step guide on how to build a paper aeroplane. Credit: CCSTI.

It is also possible to carry out other experiments with air:

- Inflate and deflate a balloon
- Make a small parachute out of a plastic bag

Part 3: Making a diamond kite (140 min)

Each child should have a kit with the following materials:

- A connector (3D printing instructions provided)
- A piece of fabric to make the canopy (preferably nylon or polyester)
- Two sticks or rods, preferably 105cm in length
- Kite handle
- String

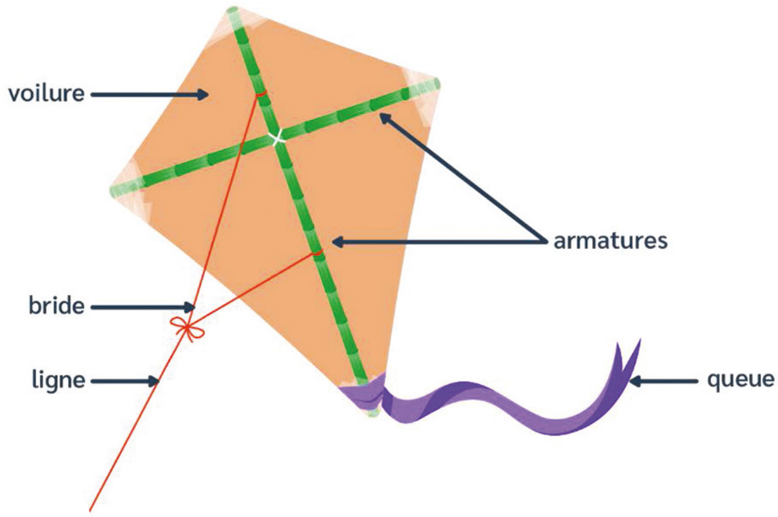

Figure 5.6: Components of a kite. Credit: CCSTI.

3.1 Crossing the two rods perpendicularly

Each rod is 105cm long. The crossing should be done as shown in the diagram: 1/5th of the vertical rod from the top (25cm) and 1/2 of the horizontal rond (52,5cm).

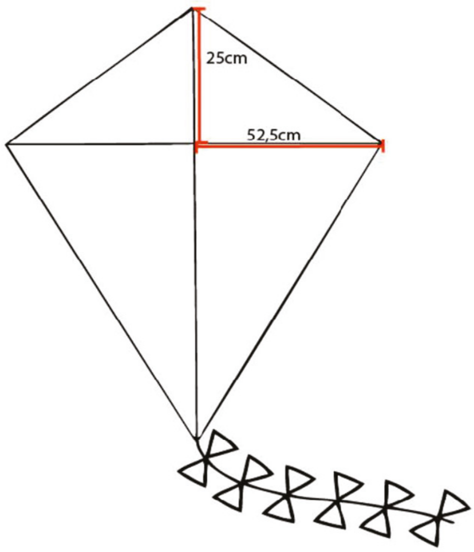

Figure 5.7: Location of rod crossings. Credit: CCSTI.

3.2 Creating the sail

The fabric for the sail should be cut to the size of the sticks and in the shape of a diamond. To help the children cut the sail to the correct size, you can prepare a cardboard model in advance.

Figure 5.8: Creating the sail. Credit: CCSTI.

3.3 Sewing the canopy and making the decoration

Divide the group in two. The first group will use the sewing machine to hem the canopy while the second group will make the decoration for the kite. It may be possible to make decorations with predefined images and the vinyl cutter.

Second session (180 min)

Part 1: Feedback (20 min)

Welcome the children and ask for feedback on what was covered in the first session. Recall scientific knowledge if necessary.

Part 2: Completing a diamond kite (160 min)

2.1 Making the tail and the handle (80 min)

Divide the children into three teams.

First team: Cut four pieces of fabric (6cm x 3cm) and make a braid in each corner of the canopy using the sewing machine.

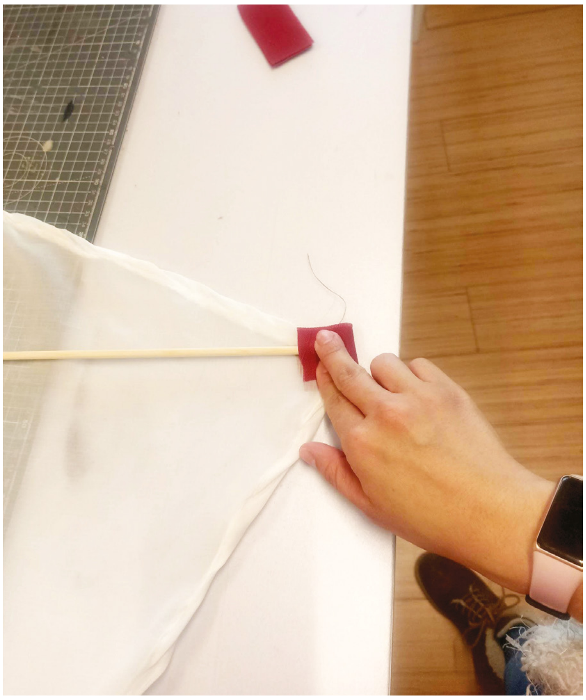

Figure 5.9: Creating the braids. Credit: CCSTI.

Second team: Build the tail of the kite from plastic bags or fabric scraps. The tail should be long and light enough to provide a stabilising swing, about 150cm.

Third team: Wrap the string around the handle to create a coil.

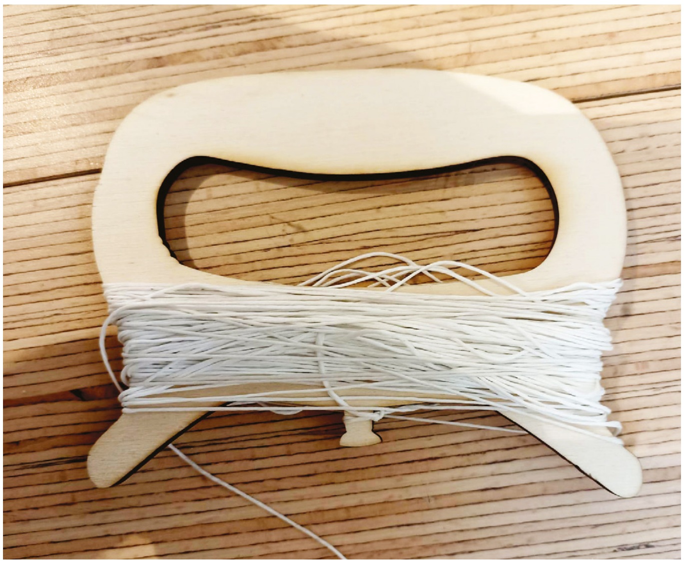

Figure 5.10: A handle with coiled string. Credit: CCSTI.

When each team has finished its work, swap groups.

2.2 Making the bridle and tying the tail (80min)

The children will now make the bridle for the kite. The bridle is an arrangement of strings that hold the kite at a specific angle while it is flying. Following the diagram below, the strings are attached to the kite at points A and B. The strings are then brought together and attached to the handle at C.

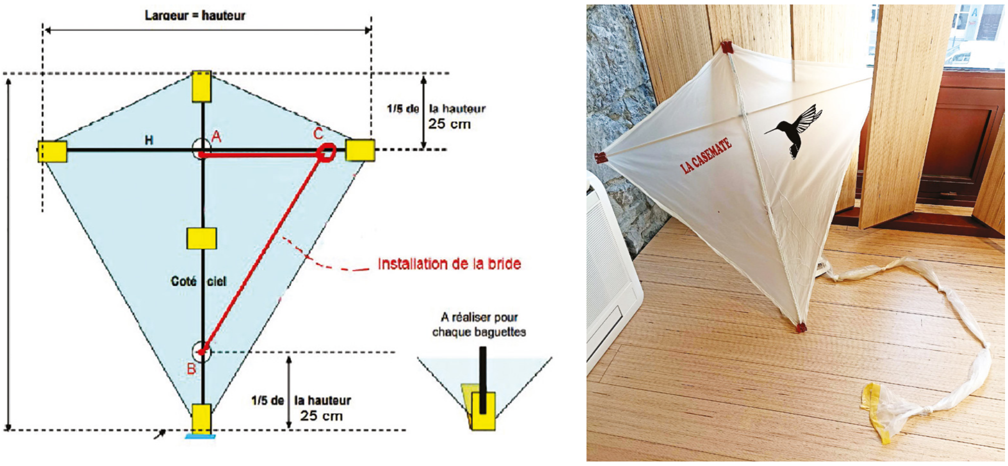

Figure 5.11: (Left) Schematics of the kite and (Right) a finished kite. Credit: CCSTI.

Finally, go out to test the kite!

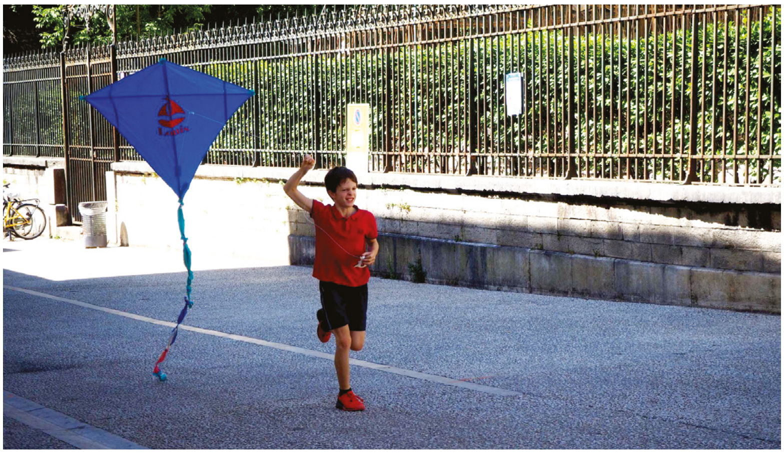

Figure 5.12: A child flying a kite. Credit: CCSTI.

Conclusion

This workshop will provide young people with an introduction to air and its properties, allowing them to learn how to make an object using DIY tools and to discover the machines in the Fab Lab: laser cutter, vinyl cutter, 3D printer, sewing machine.

Credits: This activity was developed by Fab Lab at Centre de Culture Scientifique Technique et Industrielle de Grenoble, La Casemate (OSHub France).