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Wind turbine for AutoSTEM

Pedagogical guidelines and construction instructions

This guide includes:

- How the Wind Turbine can be used to learn STEM areas
- How to construct a Wind Turbine

How the Wind Turbine can be used to learn STEM areas

What is the Wind Turbine

The Wind Turbine is a turbine done with paper cups or paper sheets that turns around when acted by wind. It can be used to move other objects or devices.

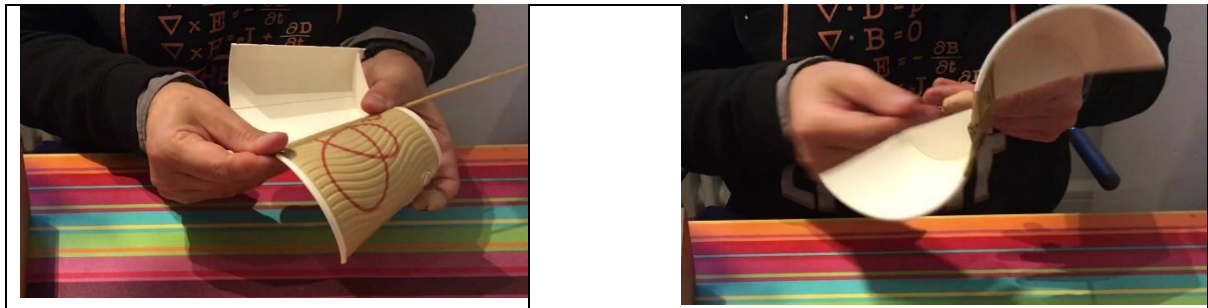


Figure 1 An example of a Wind Turbine



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The following are ideas how to introduce STEM concepts when constructing the Wind Turbine. The teacher can adapt these suggestions to their own class and context and plan their own activity (Plan template).

Target group

The Wind Turbine example described here is designed for children from 4 to 7 years old. Teachers can adapt the proposal to other ages.

The teacher can decide depending on her/his knowledge of the children whether the children should work in groups or individually.

Learning goals

When constructing the Wind Turbine several learning goals can be achieved:

- To learn about physics and energy sources, in particular, wind energy. It can also be used to learn about energy transformation, namely transferring the energy in the moving air into a mechanical device.
- To develop engineering competences of analysis and construction.
- To learn mathematical concepts within the construction and assembly process, including shapes.
- To learn concepts related to the object choosed to move.
- Other soft-learning goals can be included; problem solving and creativity.

Guide how to introduce STEM concepts during construction

The starting point is the Wind Turbine, how it functions and how to construct it.

Observing

The first thing the teacher does is show a model of the Wind Turbine turning around. The teacher can ask “why did it move?” Here is a link to a video example, that can be used.

Exploring and learning about physics and mechanisms.

Children can observe the Wind Turbine, and make comments and ask questions about how it functions.

Teachers can talk about energy sources in a very simple way. They can also talk about energy transformation, namely transferring the energy in the moving air into a mechanical device.

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Starting to construct the doll and learning mathematics and biology

Continuing with learning about shapes.

The teacher talks with the children about the different parts, their shapes and placement. This is a link to a description of a truncated cone.

What does the wing look like? The wings are two halves of a truncated cone.

Children can also discuss and offer ideas how they would make blades for the Wind Turbine, they can talk about what shapes the blades must have.

The turbine can be linked to another object, e.g. the Colour Spinning Disk, in order to make it move.

Constructing the mechanism to develop engineer competences

Children can then start to analyse materials needed to construct the wind turbine.

The teacher continues talking with the children about the pieces and materials to construct the mechanism.

Children construct the mechanism following the method described in How to construct Wind Turbine.



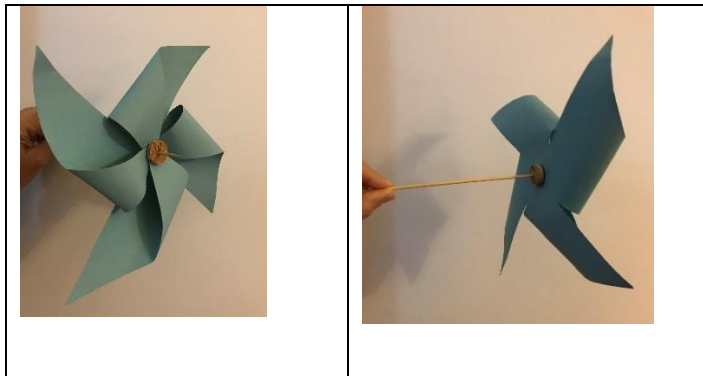
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Variations on the Wind Turbine and adding scenarios and narratives

Wind turbine can be constructed with a sheet of paper and different objects can be linked to it.

Different scenarios can be developed for the Wind Turbine. The scenario can be used at the beginning of the activity or the end.

Narratives and stories can also be used.



Figures 3 and 4. Example of other wind turbine



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How to construct the Wind Turbine

To make the actual Wind Turbine a paper cup, a wood stick, Scotch tape and a scissor are needed, as well as a box to support the turbine.

The wind turbine can also be done with a sheet of paper, a wood stick and two cork slices.

Parts and tools required

- Paper cup for the truncated cone.
- Long sticks of wood (skewers) The ones used for cooking are perfect as the children can cut them easily.
- Scotch tape
- Scissor
- Box (a shoe box or similar small box will do).

Since the materials that can be used are very wide and easy to find, the teacher can ask the students to find objects that might otherwise be thrown away (bottle tops, paper...) in this way we can add conservation and reusability in to the teaching of the workshop.

Method

It is best to watch the tutorial video before starting to make your Wind Turbine.

1. Cut the paper cup in two equal parts.
2. Using Scotch tape, glue the wood stick with one half of the paper cup.
3. Use also Scotch tape to glue the other paper cup half with the stick. The parts of the paper cup must be put together considering the opposite side of each other.
4. The turbine is ready. Now you can use a box to support the turbine and in its opposite side to introduce an object, e.g, the Colour Spinning Disk. When there is enough wind, the turbine will rotate and make also the Colour Spinning Disk rotate.

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