

Possibilities for use in competency-based lessons

Competencies that can be gained when building and working with the recycling table lamp with rainbow LED :

- creating drawings (as a planning proposal or an illustration)
- choosing suitable materials, whilst keeping functionality in mind
- if necessary: show knowledge of responsible and sustainable dealings with materials and using them in a task-oriented way (upcycling)
- dividing work processes into meaningful steps and choosing necessary tools
- creating simple electrical circuits and sketching these while using appropriate symbols
- construct an electrical circuit using LED; thus finding out about how a LED works. Thinking about its impact on power consumption
- reflecting and evaluating work processes

Suggestions for the use of the materials in lessons:

Necessary prerequisite knowledge: the children need to be able to build a simple circuit with a battery, light bulb and switch.

Preliminary notes: In contrast to incandescent light bulbs LEDs can only be used in one direction. The resistor ensures that the current is uniformly flowing. Therefore a LED should not be connected to a battery without a resistor.

- Using a lamp built by the teacher consider what it lights up. For this step 5 from the student material can be brought forward and used.
- Constructing the wooden frame (working together with Technology & Design teacher would be useful)
- Finding a suitable box needs to have a solid surface to fit the electrical circuit on to and needs to allow for two drill holes; for example a cardboard box or a plywood box; for the boxes a saw and a plane will be required (or drilling). Here the thought of upcycling is brought in; which means instead of destroying old products they will receive new value (and a higher value than waste material) by changing their use.
- Testing the uses of a LED based on the children's knowledge of electric circuits. For this the energy station (Opitec instructions 115.970) can be used too. Close the circuit using the resistor to avoid overloading the LED!
- Build the lamp according to instructions.
- Look for a possibility to improve the weak light of the LED (see student material). You could build a lampshade as well, for example by using a small balloon as a base, onto which paper scraps are glued with wallpaper paste. Once the wallpaper paste balloon has dried, the children can cut out a sphere-shaped lampshade and place it over the LED.
- Get information on the advantages of LEDs in comparison to other light bulbs; look into other ways of saving electricity.
- Extension: Write a non-fiction text (instruction, description); find out about the energy-saving measures at your school; start a project week on the topic of upcycling, ...

Didactic background: Technical Education

It is important in terms of successful technology education that each time children express the knowledge they already have in assumptions and drawings (direction of rotation, speed). After the experiments these assumptions are compared and evaluated with the observations and results. Self-developed solutions are preferential to given ones. Hence the instructions are only one option to ensure that the construction of the desk lamp will succeed safely. Variations are expressly welcomed, e.g. when working in the context of upcycling. When working with technology, it is necessary to reflect about the disposal of materials. Upcycling takes this a step further: starting with the idea that even old objects offer more than just their original purposes, the object is employed for new, different uses and might be painted, installed or bent for that reason. Inspiring design ideas can be found for example on <http://www.andersdenken.at/upcycling-kreativitaetstraining/> (as of 19.6.2016)

A definition:

When upcycling waste or useless materials are reconditioned into different products. Contrary to downcycling this type of recycling leads to a material revaluation. ... From: <http://de.wikipedia.org/wiki/Upcycling> (as of 06.19.2016)