

3D Printing: Part 1: Basics

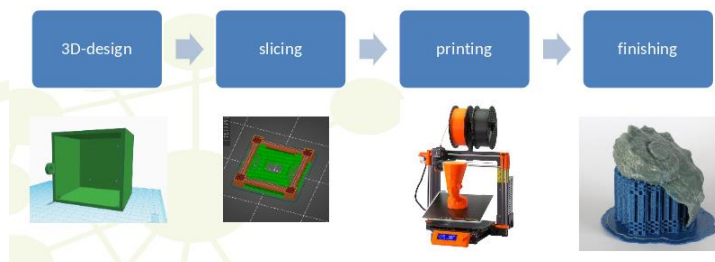


School subjects
STEM
Age of students
12 -18
Aim of the activity
This activity provides knowledge about the STEM in the context of real-life applications and STEM digital world of work.
Background
<p>3D printing has emerged as a wonderful tool in STEM education. Without much prior knowledge, learners can apply their theoretical STE(A)M-knowledge and solve real-world problems.</p> <p>3D printing is both a very simple and a very complex technology. Nowadays, the use of a 3D printer does not involve high costs or a very long training period, but a target-oriented application requires the user to have a interdisciplinary understanding of the technology used.</p> <p>This learning unit belongs to a workshop series that provides all-round knowledge about 3D printing in order to be able to develop products with this technology. Nevertheless, it is possible to use it in a school class or an out of school activity to make thematise modern trends and show the applications of STEM in real life and to solve real life problems.</p>

Activity

Input

- First of all, demonstrate some objects that can be 3D printed and why: applications in areas such as medicine, art and sustainability. For example, a screw driver, prosthesis and denture etc.
- Provide information on which technologies are used for 3D printing and what materials are used.
- Sustainability is an important topic to cover, when speaking about 3D printing. Tell about the materials and their sustainability, how to use them in an ecologically correct way and what to do with the printing waste so that the environment does not suffer unnecessary damage.
- tell and show how does 3D printing actually work



Task

Participants have to log into the tinkercad themselves. Create password and user accounts or the participants beforehand.

Input

Cover the following points:

- adding surfaces
- subtracting surfaces
- functions of the tinkercad

Task

! Design a box not bigger than 10x10x10 cm, wall thickness of 3 mm (set the size of the objects regarding the group size and the number of available printers. Printing the objects takes time).

! think about possible drawers, doors and compartments

! you can create other shapes and create more floor panels

(For this phase we suggest providing a mentor that can help with the questions of the participants. The number of mentors depend on the number of participants. We advise to assign one mentor per 4-person group of participants).

After the test phase where participants have gained an idea of the possibilities in the tinkercad, give instructions what is the product the participants must develop. Make them think about the geometry of the whole product: which parts have to be functional and in what way, which serve just aesthetic purpose. In the case of escape boxes it is intertwined with the subject of storytelling. What is the story the participants are telling with their riddles? This part is covered by another workshop ([link to the description](#)).

Time necessary

45 minutes input and approximately 2 hours of individual work.

Learning outcomes

Through this session participants learn

- several applications of 3D-printing in industry and research.
- how to use 3D-printing in a sustainable way.
- how 3D-printers can be used to print escape activities and/or escape boxes
- the basics of 3D-Design (CAD) with Tinkercad

Costs

Costs for printing material.

There is a variety of price range to consider when choosing the material. Also, one has to calculate some extra material in the event of printing mistakes. We suggest calculating 15 € per Person for printing during the whole Summer School (testing, printing the escape boxes with the approximate size of 10x10x10 cm)

Tinkercad = free of charge

3D Printer = 500 (depends on the products you want to print. For the escape boxes this class of 3D printer works very well)

3 GB USB stick = 3 Euro

Materials

A power point presentation is available in German. Contact: icse@ph-freiburg.de

