

EARLY Teaching Scenario

Topic: 3D printing - The Sea

Aim(s):

Getting familiar with Tinkercad software

Deepen your knowledge of how 3D printers work and learn the steps to print an object designed by us

Exercise creativity in a combinatory form (given certain elements from which to create)

Applying the 7 key competences



Skills pupils develop during the scenario (connect to curriculum →)(with reference to a “Learning, the treasure within”, UNESCO, 1996 e “Defining and Selecting Key Competences”, OCDE, 1999):

- Thinking and learning to learn
- Multiliteracy
- Cultural competence, interaction and expression
- ICT competence
- Participation and influence in building a sustainable future
- Competence for the world of work, entrepreneurship

Target group: Middle school

Age of students: 11 to 13

Number of pupils: Maximum of 20

Duration (estimated time/number of lessons): 4x90 min

Prerequisites (necessary materials and online resources):

- One pc for each group
- Installation of a software for slicing (recommended software Cura, to download for free)
- WiFi connection
- A 3D printer
- Paper sheets
- Pencils or coloured markers
- Didactic Material from the project “Il Mare in 3D”
https://ilmarein3d.scuoladirobotica.it/it/newsmare3d/1113/Disponibile_adesso_il_kit_didattico_del_Mare_in_3d_.html
- Link to download Cura, slicing software (you need to register by entering some data about the use you will make of the software): <https://ultimaker.com/software/ultimaker-cura>

Introduction to the scenario:

With these lessons, students will be introduced to 3D printing. Students will learn how to realize a 3D printed object starting from the drawing phase up to the actual printing phase. The lessons will be related to the theme of the sea and environmental protection, in order to put the learning of 3D printing in a wider thematic framework that allows students to develop their knowledge not only from a technical point of view, but also from an ethical and scientific point of view. The scenario will include activities dedicated to free creation and the development of creativity, realized using the objects printed by the students themselves.

Risks and possible applications:

The scenario can be used as a starting point for a series of activities on 3D printing.

It is possible to learn more about the use of Tinkercad by following the various guided lessons on the website or the tutorials available on our EARLY platform: <https://youtu.be/RCyPmDGdNmk> or <https://youtu.be/6gBVEBly1II>

Otherwise, it is possible to explore just the 3D printing aspect using existing and printable models. The .stl files can be downloaded from websites such as www.thingiverse.com and then imported into the printing software.

Before the program begins (preparatory work for teacher):

Installing Cura

Divide the pupils into groups (3/4 pupils per group)

Preparation of the workspace: one pc for each group

Main part of the scenario (4 lessons, 1h and 30 minutes each):

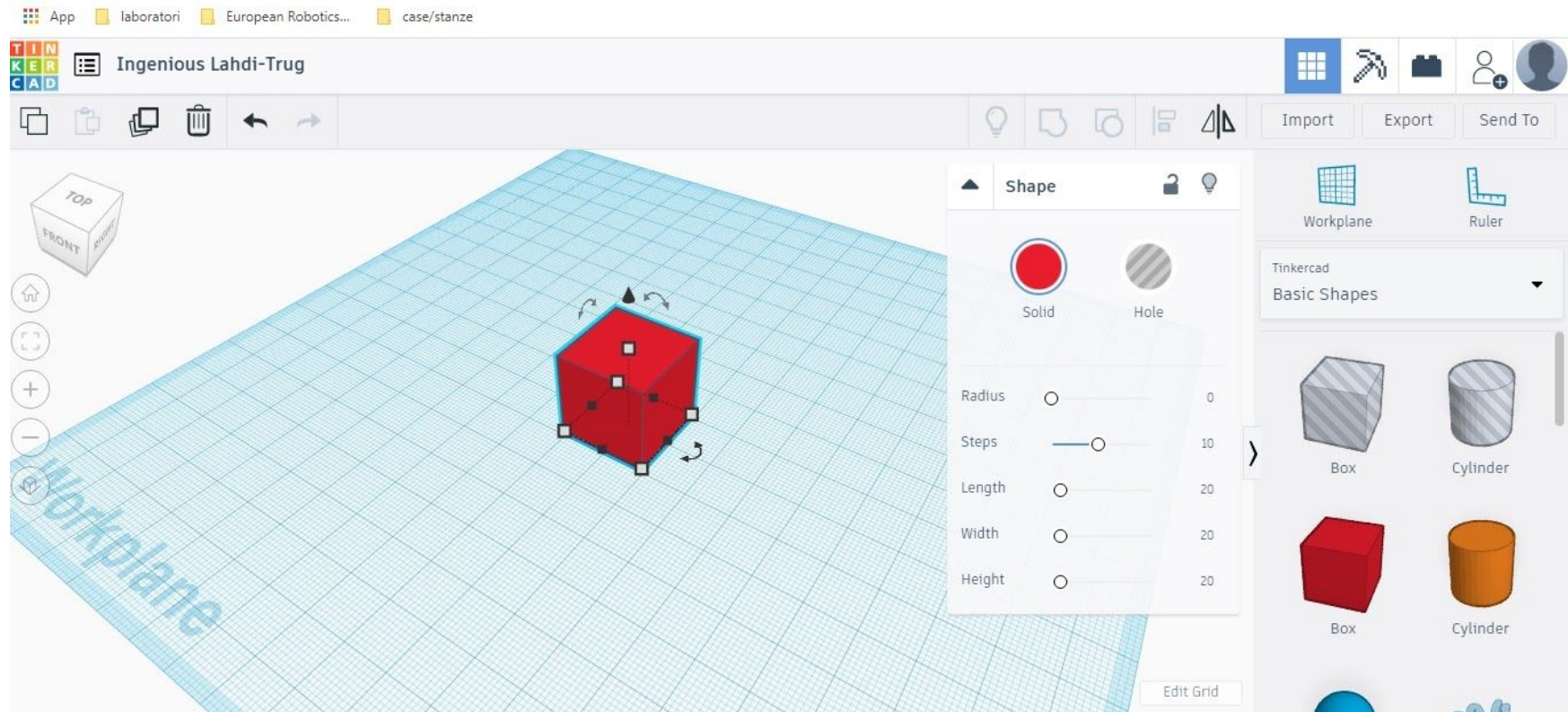
- lesson one:

Introduction to Tinkercad software, to its function and what it allows us to do.

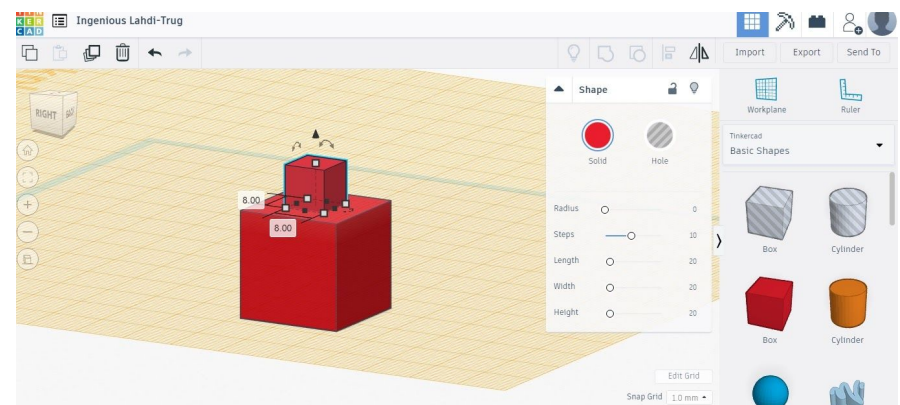
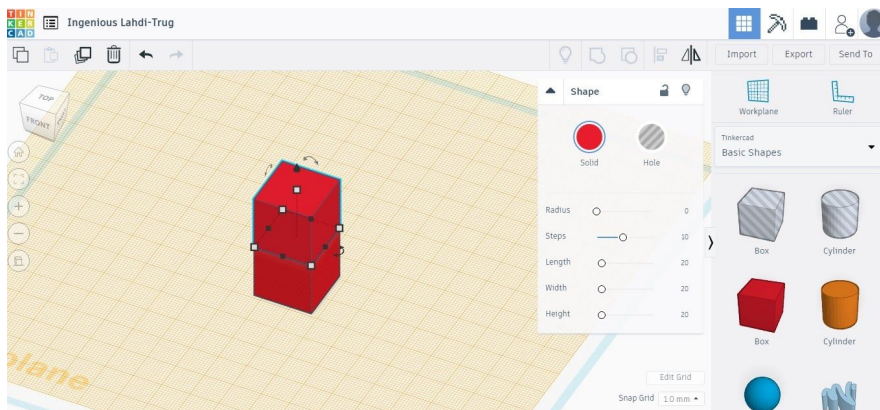
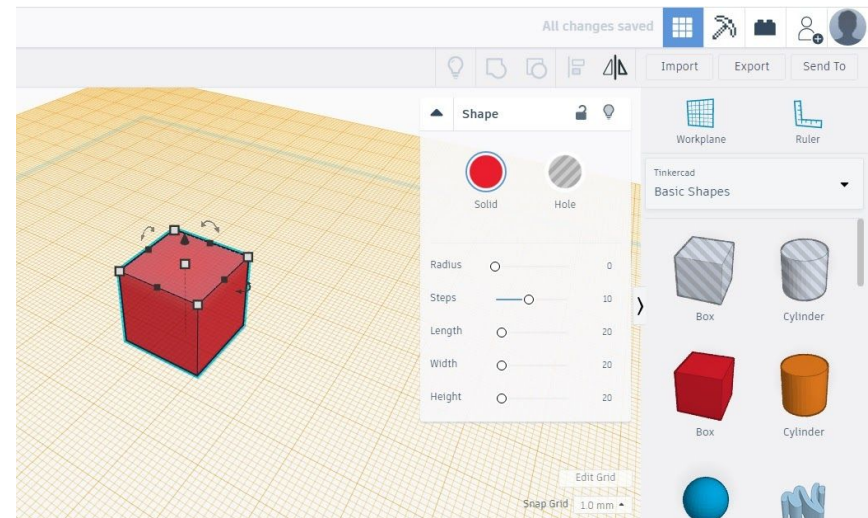
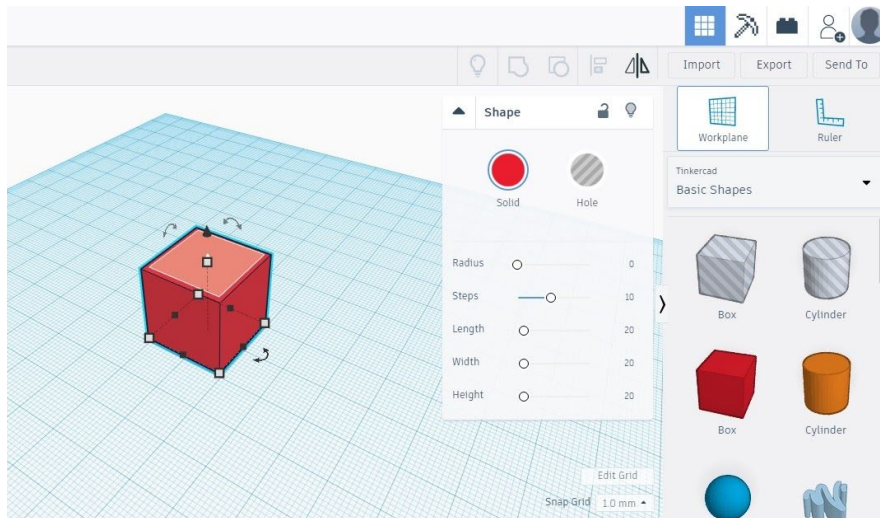
Introduction to the use of the software, explanation of the basic tools, the types of visualization of the worktop and the solids and shapes you can work with.

Pupils are invited to experiment by choosing a solid, dragging it onto the work surface and changing proportions, position and rotation in relation to the work surface.

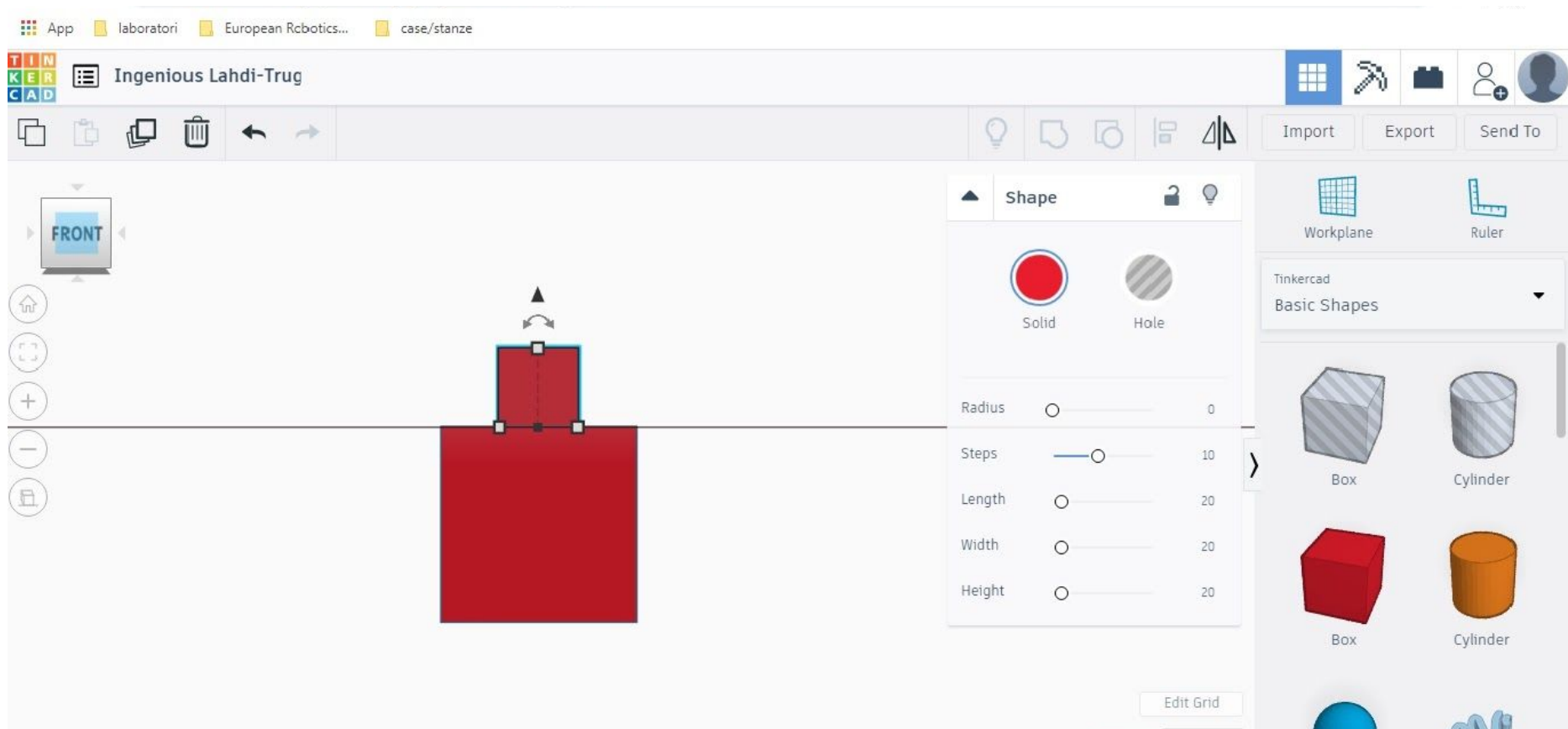
Pupils are invited to choose two solids and create a third figure by combining them at will, but this time they are invited to leave these figures placed on the worktop so that they can be easily printed.



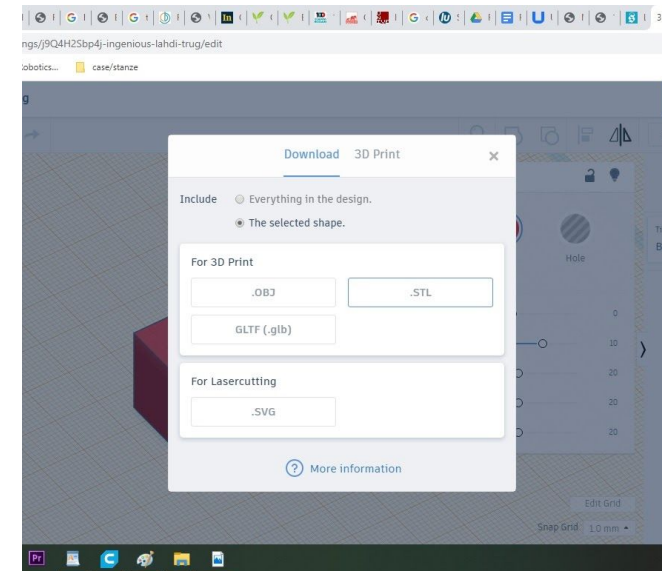
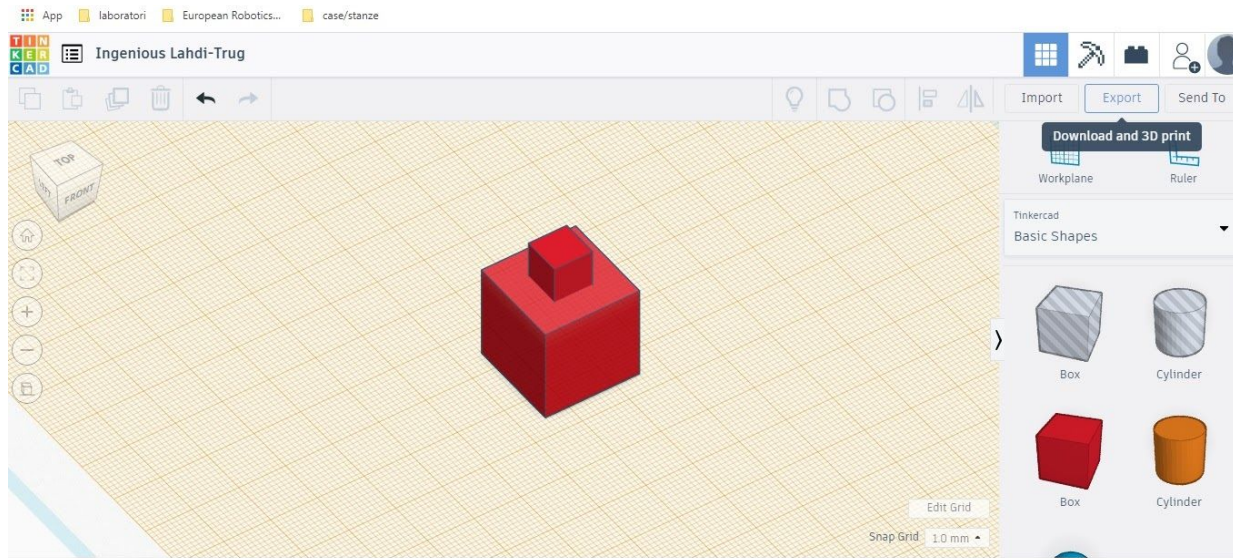
To add a second solid on one of the surfaces of the first one, you need to select that surface as the worktop



To align solids correctly, you can switch between orthographic and perspective views.

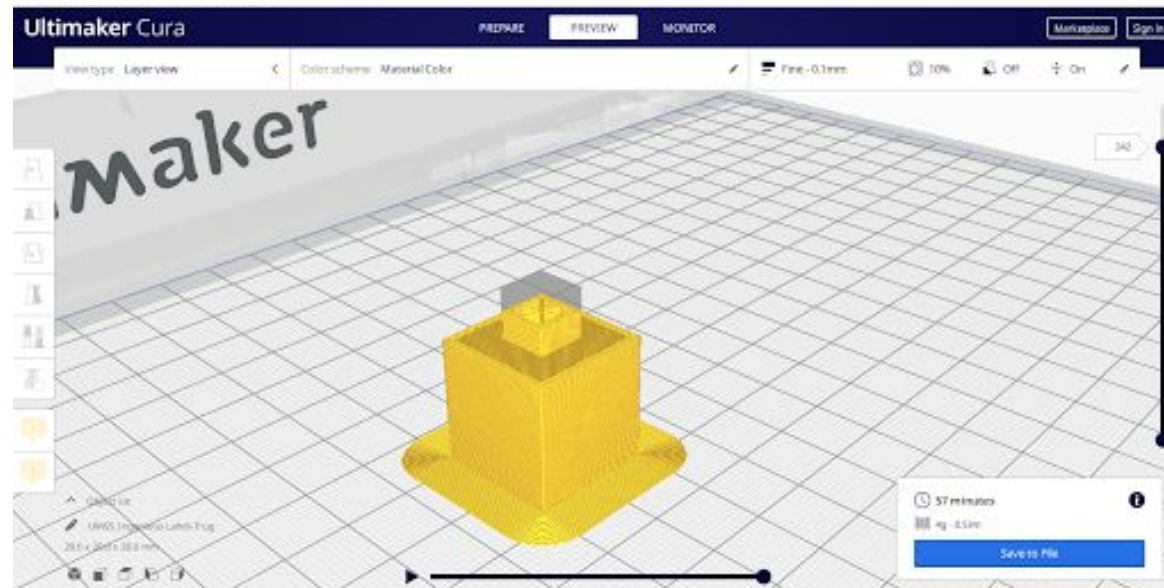
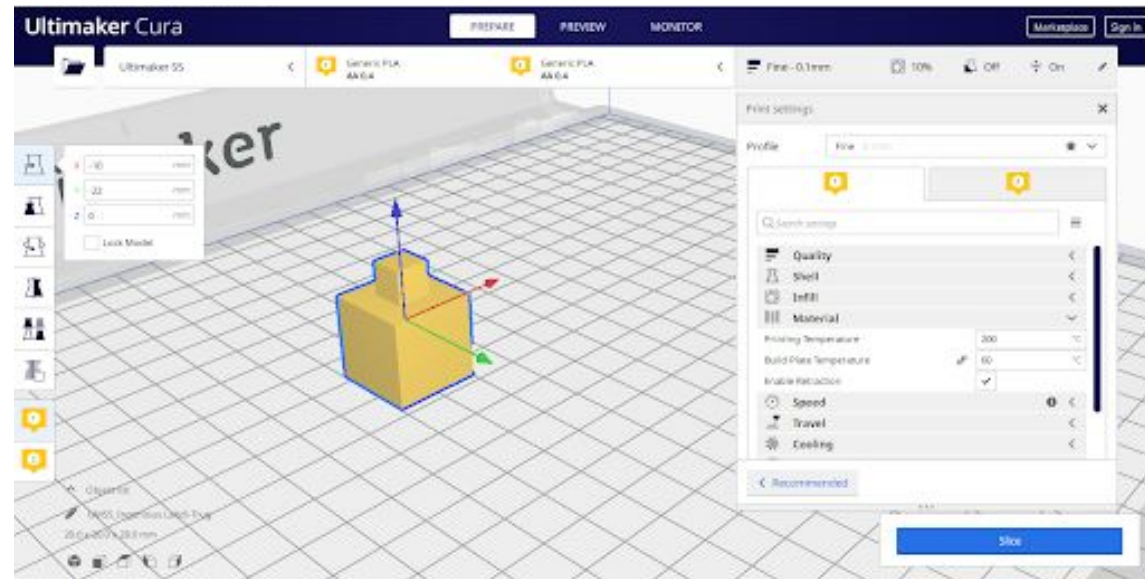


Export projects in .stl format



- **lesson two:**

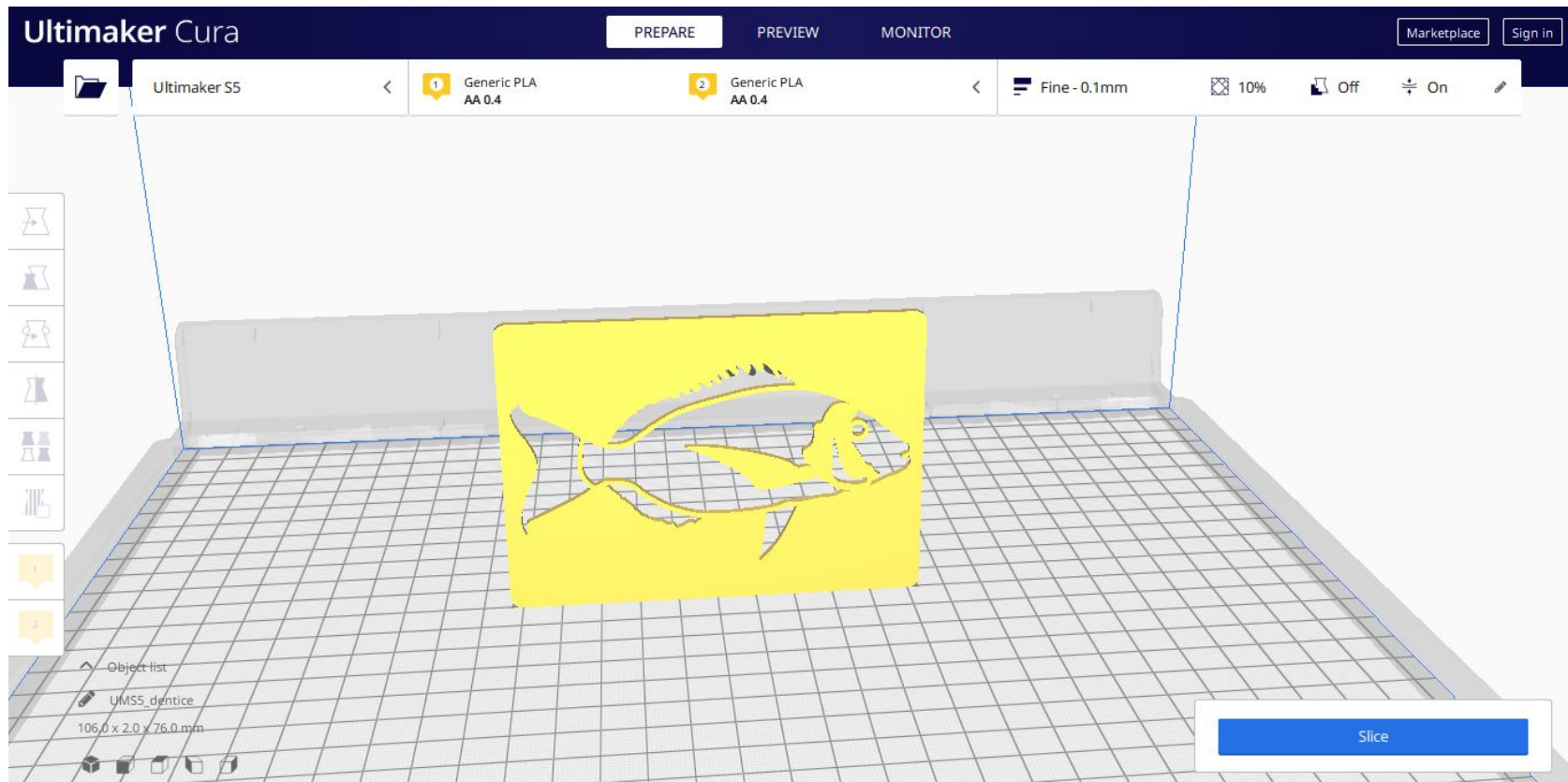
Introduction to the software Cura and the concept of slicing. Printing of the objects made by each group in the previous lesson
Select Slice to start Slice and Preview to view the filament progression.



- lesson three

Introduction of the theme of the sea through the material of the project Il mare in 3D (downloadable from the page https://ilmarein3d.scuoladirobotica.it/it/newsmare3d/1113/Disponibile_adesso_il_kit_didattico_del_Mare_in_3d_.html)

Each group chooses a model from those available (stencils of different species of fish, reproduced in detail) and prepares it for printing autonomously. During the printing process, each group will be invited to carry out a research, online or in booklets provided by the teacher, on the type of fish chosen. At the end of the lesson each group is invited to present to the rest of the class what they have discovered about their animal.



- **lesson four**

(Preparatory activity: printing different types of stencils in a number appropriate to the number of pupils)

Pupils are individually invited to use three stencils representing different fish to invent a fantastical animal. Pupils are invited to enrich the animal with details, to invent its name and to fill in a card where its characteristics are described, taking as a model for the distribution of information a page of a real scientific text.

Learning outcomes

- Introduction to 3D graphics
- Introduction to 3D printing and its creative potential
- Exercise of creativity