

Making toys with a 3D Printer

Making toys with 3D Printers- An INDIRE project aimed at the Andrea del Sarto and Rodari Infant Schools.

The essence of the child and of his/her learning processes are key points of the National Curriculum Guidelines. Maria Montessori said: "The hands are the instruments of man's intelligence.". From an active pedagogical viewpoint, practical work in the classroom is considered to be the best way to enhance children's learning and is the preferred method in Infant School.

For the last two years, several Infant Schools in different Italian regions have been involved in a research project promoted by INDIRE (National Institute for Educational Innovation and Research) with the aim of investigating the role of the "tinkering" approach, and more specifically the practice of "making" toys with 3D printers, as a support for the development of scientific and operational skills in the context of the Infant School, with the objective of identifying eventual didactic applications.

The Infant Schools in the Municipality of Florence involved in this project are the Rodari and Andrea del Sarto schools.

The objective: how children work

According to the theory of active pedagogy, children have to learn how to face a problem properly (problem posing), how to solve it (problem solving) and how to work in a group, in collaboration, to find a solution. All this while making toys, fundamental objects for learning in this age-group, by following these steps:

- a) Think – the problem-setting phase, brainstorming and planning for problems related to the production of the object.
- b) Make – the actual construction phase
- c) Improve – correction phase for any eventual flaws in the object: if it doesn't work or it doesn't look as planned, the aim is to improve it by repeating the previous steps.

The experimental activity is aimed at small groups of children aged 5 years and some of the teachers in the participating schools.

The activity, based on the telling of a story, involves the planning of objects from the story itself and their subsequent design, first of all on paper, then on tablets or on the IWB, both as bi-dimensional and tridimensional forms.

When the object is finalised on the Interactive WhiteBoard it is then printed using the 3D Printer.

So, the children work on the object, analyzing its functionality and correcting it, if necessary.

- INDIRE researchers: observe key steps in the experimental activity in a non-participatory manner; carry out interviews with the teachers and children, recording the activity with photographs and videos.
- The teachers in the participating schools: carry out the didactic activity using action-research methodology; they assess the children's actions based on an ad hoc evaluation grid; they keep a diary recording facts, observations, considerations and they document the activity with photographs and videos.