

## **Module 3 Introduction to Educational Robotics Script**

Welcome everyone; my name is Tullia Urschitz. I'm a math & science teacher in a junior secondary school in Italy and I also have some lessons at kindergarten and primary school. The drawing in this slide, in fact, was done by one of my students and shows my work in the vertical curriculum, from the 1<sup>st</sup> to the 8<sup>th</sup> grade. Since November 2013 I'm Italian Scientix Ambassador.

During last 7 years I have been using Educational Robotics inside my teaching, collaborating with the School of Robotics in Genoa, to engage more boys and girls into STEM subjects.

### **Why use Educational Robotics?**

Educational robotics is a methodology that involves the use of robotics to generate competences inside regular curricula. It has the aim to involve students of all ages, from kindergarten to high school, in the study of STEM subjects with a new approach.

Technological tools may promote inclusion, that means that talented students and students with learning difficulties can easily work together; anyway, technological tools do not automatically guarantee good results without suited pedagogical approaches. We therefore need to understand why and how we should use robotics in our teaching.

The use of educational robotics encourages students in guided discovery and in problem solving; students get used to work in teams to solve problems, find solutions and verify results.

As robots are commonly associated with games, robotics kits thereby are **learning mediators**: they combine the reconstruction of the knowledge the students get during the school activities, with creation, invention and conceptualization, developing skills and competences along the way.

Learning emerges from cooperative working, from a new role of the teacher, who becomes simply a facilitator of the learning process. Robotics involves students with different cultures, linguistic heritage, age, learning styles, gender: girls love robots and are more engaged in STEM subjects when working with robots.

Educational robotics can easily find a place in traditional math and science curricula to develop key competences: it increases learning motivation, the use of a proper language, the growing of mathematical, scientific and digital skills, helps to develop entrepreneurship.

### **What kind of competences can we grow with Educational Robotics?**

First of all we have to remember that key competences are a combination of knowledge, skills and attitudes.

The key competencies identified by the European Commission for the Life Long Learning are those described hereafter. Key Competences are very important for personal fulfilment and development, for social inclusion, active citizenship and employment.

## **How can Educational Robotics develop these skills?**

Designing, building and programming robots means having to share ideas, drawings; it means collaborating, team-working. The continuous exchange of ideas among the members of the group enables the improvement of the communicative skills of the students who must communicate their own ideas clearly and synthetically at many levels, through many means of communication: design, technical text and oral communication.

In order to be able to conduct research and be able to build robots, students spontaneously work with foreign languages, reading instructions, finding information on the internet and, sometimes, also working on webconferences on common projects with pairs from abroad.

The obvious link between robotics and mathematical, scientific and technological disciplines often makes it more difficult to understand how radically the lessons of these subjects can change from the methodological and process point of view with the introduction of the use of robots. Educational robotics enables the understanding of scientific topics from various points of view and makes them more comprehensible to different types of learners. Furthermore, the conception of error changes radically: the error is no longer seen as a judgment but as an incentive to change one's own skills.

Digital competency is a key competence evidently linked with educational robotics. In order to program robots it is necessary to use computers. Furthermore, working with robotics inside the disciplines curricula, often requires to record data or to present the results of the whole project, that's why students use many digital tools and apps.

The role of the teacher changes, when working with educational robotics. The teacher becomes a coach; he has the task to coordinate activities. Students are pushed into learning processes linked with observation, experimentation, abstraction and theorization, becoming able to build their own awareness and explicit way of learning.

Team-working and the acceptance of contributions from each team member allow students to recognize differences and accept them to improve the work of the group. Recognizing and collaborating with diversity are two components of the social aspects that educational robotics contributes to develop.

Sense of initiative and entrepreneurship are experienced by students at many different levels:

- through the sharing of their own ideas during the robot design;
- listening to the ideas of classmates;
- through the management of the group;
- through the proposal of personal solutions at programming level.

Cultural awareness and expression are competences that are usually presented through creativity. There are many students who re-process the robot idea, creating innovative and aesthetic designs and personalization of the robot.