

## TOPICS COVERED WITHIN THE CURRICULUM:

### 1 - THE ELUSIVE ANGLES

- This is one of the most difficult subjects for children in the stage of 11-13 years since it requires quite an abstract knowledge to connect the apparently huge angle drawn by the sun in the sky to the one formed by its shadow during the same amount of time. We used robots to encourage our kids to explore angles and verify that  $+90 = -270 = +450$  with a view to the day they might evaluate the root of a complex number.
- Pupils were asked to program the robots in order to go all the way back from the final point to the start. They learnt every command is reversed and the lines must be read from the bottom to the top.
- We urged everyone to connect what they were doing with some authentic problem such as going around in a circle one or more times while deciding which is the right exit.

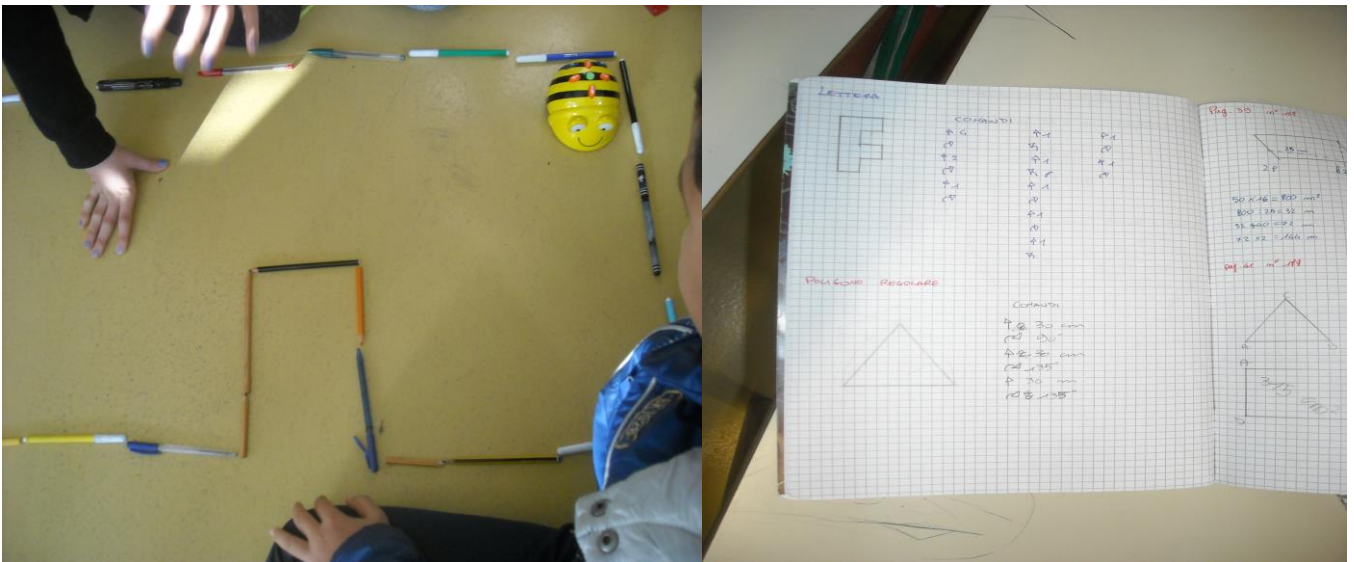
### 2 - OUR CLASSROOM ON THE SCHOOL MAP

- For security purposes there's a map of the building attached on the door; we started from it to manage reduction scale that may maintain proportional lengths.

- The classroom is a particular polygon: a concave exagon which puts problems with the sum of external angles; our children had a chance to learn angles may be positive and negative.

### 3 – LOCAL REFERENCE SYSTEM

- Keeping on playing with concave polygons (which are not easily treated in textbooks) pupils themselves suggested some letters are exactly of that kind and we let them explore what happens if a Bee-bot or Pro-bot is used to draw one of those.
- Although looking at a letter a segment of it appears pointing toward left, from the point of view of the Bee-bot or Pro-bot a right turn must be taken; this spurred us to discuss how different orientation is for different subject and connected this with authentic problems such as the instructions received by a Global Positioning System device.



### 4 – LENGHT MEASUREMENTS

- We used the forward steps of the Bee-bot as the unit to measure how distant may a point be from another. Also we tried to connect this with an authentic problem and picked the suggested secure exit for the classroom: it's closer and thus is the one that will be reached in a shorter time. We didn't go further on considering velocity a variable term, since not all our children were ready.
- Referring to a step unit which doesn't match the usual ones children are accustomed to, was the sparkle for starting new explorations on integer numbers.
- With a view to introducing the orthogonal system next year, we asked our children to translate the path in a sequence of coordinates, because all this is instrumental to the vectorial approach in the description and analysis of

dynamical motions. The idea is to prepare the ground for difficult subjects to come.

5 – ETHICS (what does being human in this technological epoch mean?)

- The Glass Cage: How Our Computers Are Changing Us  
Nicholas Carr 2015 Cortina Raffaello Ed.
- I, Robot (The Robot Series) Isaac Asimov 2004 Mondadori Ed.
- Though slower than computers, humans go farther; why?  
Luca De Biase "Homo pluralis" 2015 Codice Edizioni (Torino).
- **I am really glad I found true collaborative spirit in my colleagues Prof. Matthias Stohrer and Prof. Francesco Mori who helped me in making the overall experience complete. He suggested both the above readings, for we both love the Renaissance view of knowledge, in order to offer a total perspective on what robots are. Humans can ask questions!!!**

**Title of the experience:**

One Probot and two Beebots wandering around paths

**School:**

Mohandas Karamchand Gandhi \_\_\_\_\_

Class/Age \_\_\_11-12years\_\_\_\_\_

Number of students \_\_\_20\_\_\_ (males \_\_\_10\_\_\_ females \_\_\_10\_\_\_)

**Teachers involved:**

1. Name \_\_Erika D'Ambrosio\_ Subject \_\_\_\_\_Math & Science\_\_\_\_\_
2. Name \_\_Matthias Stohrer\_ Subject \_\_Special Teacher\_\_\_\_\_
3. Name \_\_Francesco Mori\_\_\_\_\_Subject \_\_Italian Literature\_\_\_\_\_

Start date \_October 17th 2016\_End date February 28th 2017\_\_\_

