

# SCIENCHY – catchy science with IBSE approach

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# Why use IBSE (Inquiry-Based Science Education)



...to encourage students to solve problems and explain phenomena performing experiments;

....to motivate the students and also teachers;

...to promote the cooperative learning;

...to increase the autonomy, creativity, and responsibility of students;

...to contextualize the topic;

...to internalize concepts that otherwise remain abstract/theoretical.

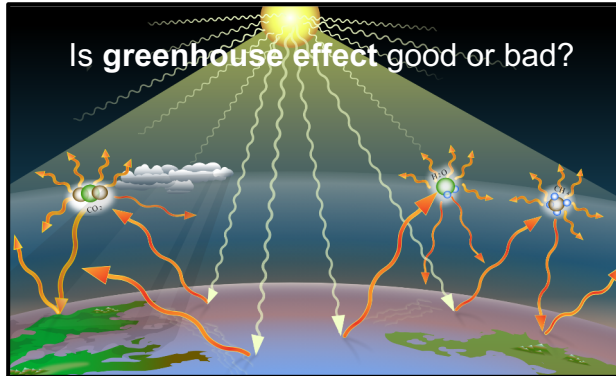




# Goals



The main aim is evaluating the success of the **IBSE approach** in **11-year-old students** of an Italian school presenting experimental lessons about “**Greenhouse gases: nature, potential sources, and effects on climate**”



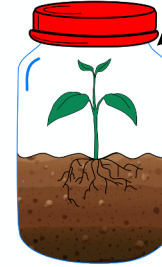
# Experimental set-up in science class

only soil (open system)

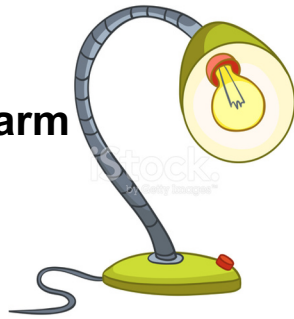
only soil (closed system)

soil and plant  
(closed system)

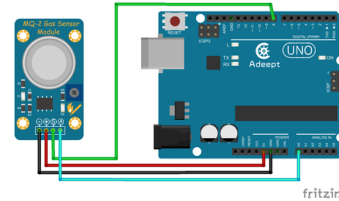
1. Create three small different ecosystems



2. Use a heat source to warm each ecosystem



3. Monitor T and CO<sub>2</sub> conditions through digital thermometer and Arduino system



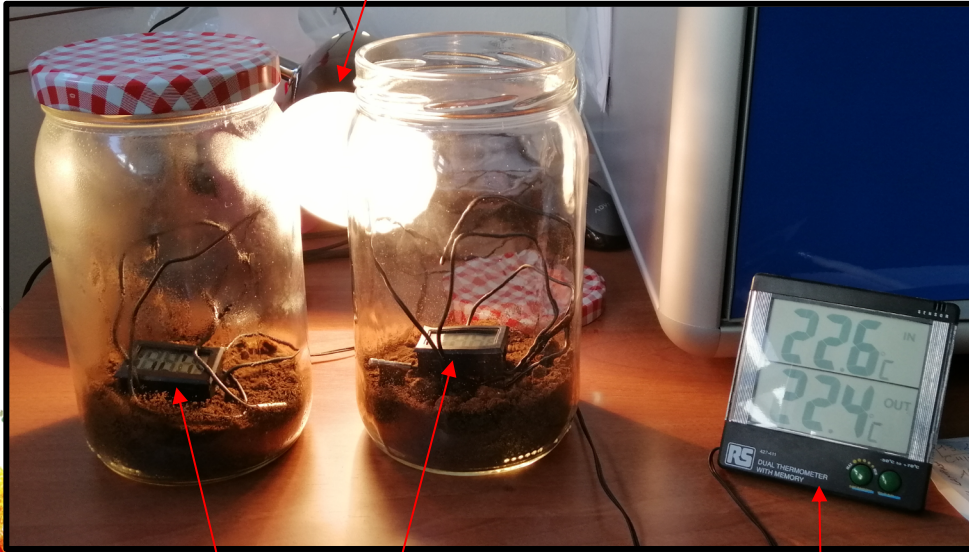


# Preliminary data: T measurement

Lamp

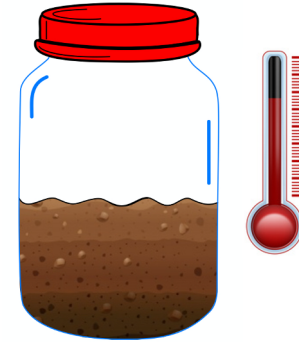
only soil (closed system)

only soil (open system)

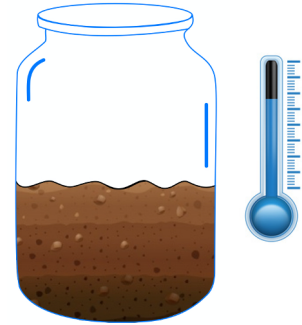


Digital thermometers

Digital thermometer for the room



T increases slowly and remains higher than the room temperature



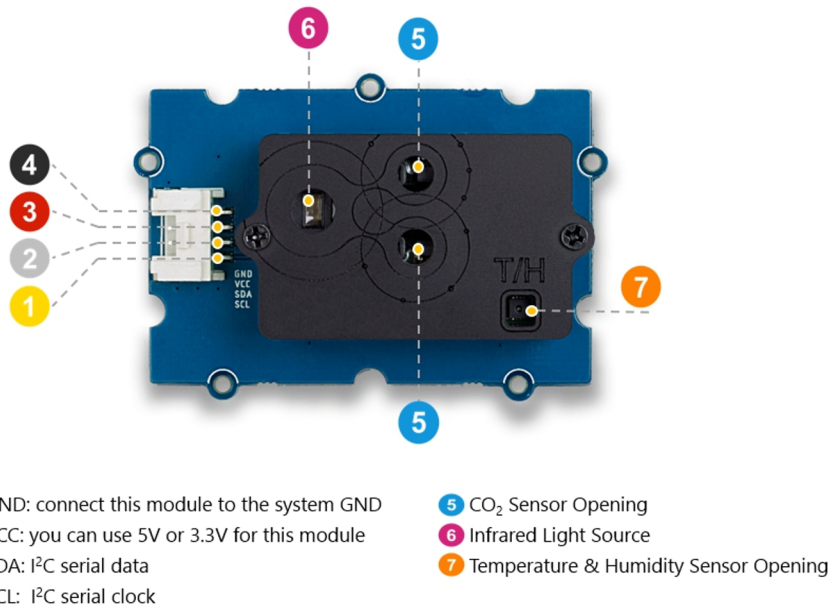
T decreases rapidly until it reaches the room temperature

# Preliminary data: CO<sub>2</sub> measurement

## Grove - CO<sub>2</sub>, Temp. & Humidity Sensor (SCD30)

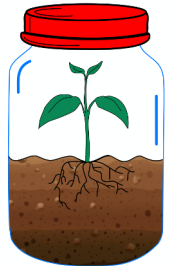
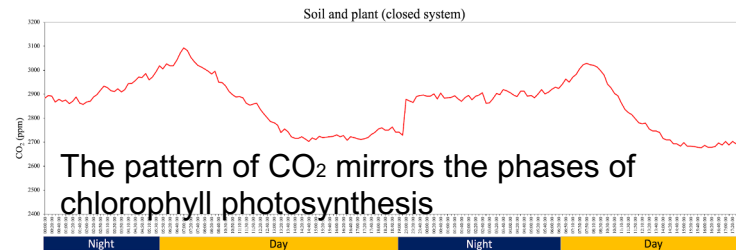
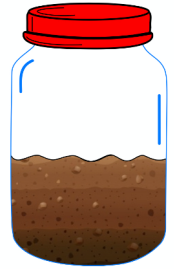
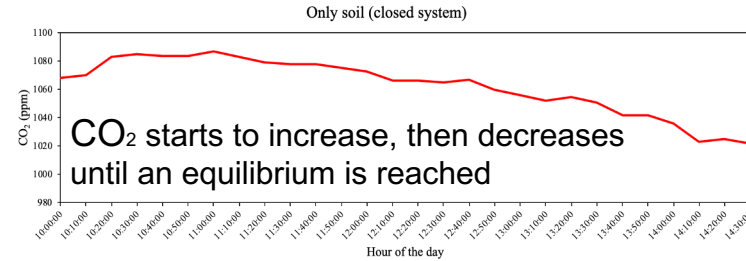
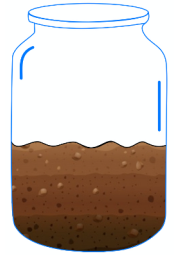
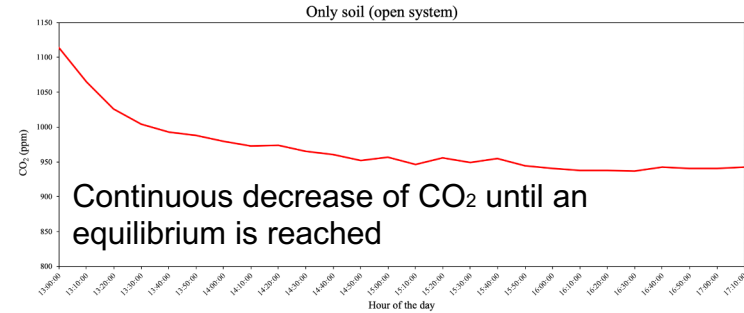
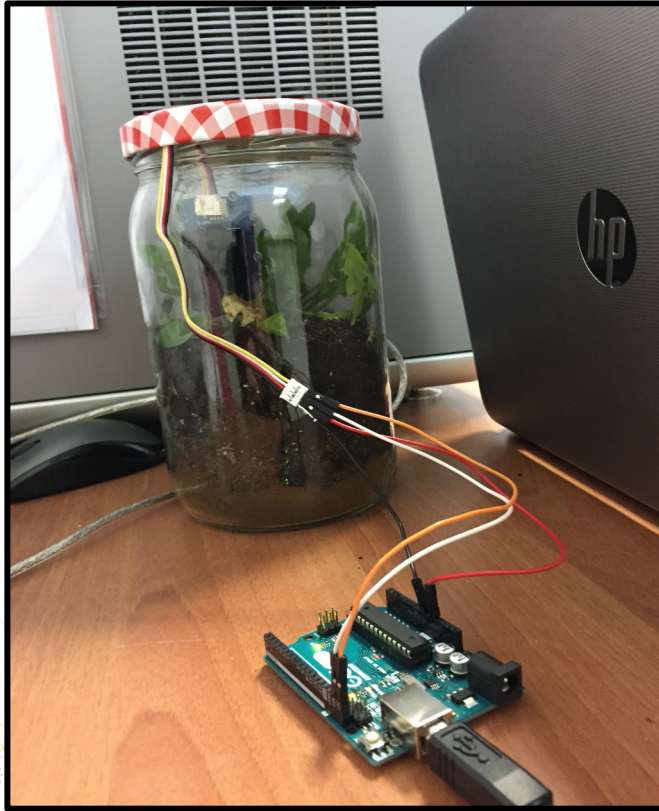
- Non-Dispersive Infrared (NDIR) CO<sub>2</sub> sensor
- Integrated temperature and humidity sensor
- Digital I2C interface readable by Arduino
- Low power consumption

CO <sub>2</sub> range		0 – 40,000 ppm
Accuracy	400 – 10,000 ppm	± (30 ppm + 3%)
Repeatability	400 – 10,000 ppm	10 ppm
Response time	τ63%	20 sec



[http://wiki.seeedstudio.com/Grove-CO2\\_Temperature\\_Humidity\\_Sensor-SCD30/](http://wiki.seeedstudio.com/Grove-CO2_Temperature_Humidity_Sensor-SCD30/)

# Preliminary data: CO<sub>2</sub> measurement





# Future Goals

The realization of a network to:

- share the project form
- analyze the large scale effect of IBSE method



Because of the sanitary emergency, we could not perform the experimental lessons in class.

We plan to promote the project in summer educational camps and in autumn in school

