



Contribution ID: 131

Type: **Flash presentation**

STEM Learning Paths for High School Students

Thursday, 15 September 2022 12:00 (10 minutes)

In the last few years, a series of learning paths for high school students from 16 to 19 years old has been tested thanks to a national network of researchers of the Italian National Research Council collaboratively working in the framework of national and European Projects targeted to youngsters. [1] The main goal is to increase the interest in STEM (science, technology, engineering and mathematics) disciplines, as well as the sustainable use of raw materials in view of the transition of a low carbon society. A combination of approaches such as open discussion, learning-by-doing, and peer-to-peer education have been used. The students are involved in an experiential learning process to develop communication competencies and increase their awareness about the role of science in sustainability development. [1]

A “5E” protocol is followed. The activity starts with one or more lessons (ENGAGE), followed by the visit in a research laboratory (EXPLORE). The students will strengthen the topic knowledge by themselves through web searches or selected scientific papers (EXPLAIN) and produce a communication product (i.e. poster, video, etc.) (ELABORATE). At the end of the learning path, they are asked to present their work at school or during science fairs (EVALUATE). [2]

At the same time, a series of educational tools, created by experts, have been implemented and tested such as “RAWsiko – Materials Around Us”, a videogame on the distribution of critical raw materials in the world, [3], “BetterGeo” a Minecraft mod that adds realistic geology to Minecraft, adding new rocks, minerals and metals, as well as realistic ways to find these [4] and ecoCEO, a board game about circular economy strategies and circular business models. [5]

Acknowledgements: The authors are grateful to the support by the CHANGEGAME Project, funded by CNR, and RM@Schools 4.0 - Raw Matters Ambassadors at Schools (project agreement No. 20069) under the framework partnership agreement No. [FPA 2016/EIT/EIT Raw Materials], Specific Grant Agreement No. [EIT/RAW MATERIALS/SGA2019/1], KIC RawMaterials Internal Agreement of 04 December 2015

[1] A. Torreggiani, A. Zanelli, A. Degli Esposti, E. Polo, P. Dambrosio, R. Lapinska-Viola, K. Forsberg, E. Benvenuti, in *Rare Metal Technology 2021 The Minerals, Metals & Materials Series*; Springer, 2021; 277–287.

[2] M. Canino, A. Zanelli, M. Seri, A. Degli Esposti, A. Torreggiani *Frontiers in Education* 2021, 6, 690294

[3] <https://arraise.com/rawsiko/>; <http://rmschools.eu/>

[4] <https://www.bettergeoedu.com/>

[5] <https://ecoceo.eu>

Primary author: Dr IENCO, Andrea (Consiglio Nazionale delle Ricerche, Istituto di Chimica Composti OrganoMetallici)

Co-authors: Dr LAPISKA-VIOLA, Renata (Consiglio Nazionale delle Ricerche, Istituto per la Sintesi Organica e la Fotoreattività,); Dr ZANELLI, Alberto (Consiglio Nazionale delle Ricerche, Istituto per la Sintesi Organica e la Fotoreattività); TORREGGIANI, ARMIDA (ISOF-CNR)

Presenter: Dr IENCO, Andrea (Consiglio Nazionale delle Ricerche, Istituto di Chimica Composti OrganoMetallici)

Session Classification: MS

