SUSTAINABILITY HUB: a virtual world island to teach Agenda 2030 and Sustainability

Michelina Occhioni, Alessandra Beccaceci, Eleonora Paris

University of Camerino, School of Science and Technology – Geology Division - Camerino, Italy

michelina.occhioni@unicam.it

Aim of the project
- ✓ To implement engaging distance learning using virtual worlds, where students and teachers access as avatars
- ✓ To support schools in the implementation of Civic and Environmental curriculum during COVID-19 pandemic

1 Learning scenario

Sustainable City Game
It is an interactive game similar to the "Game of the Goose". Each avatar becomes the pawn and the champion of one Sustainable Development Goal (SDG). The interactive game boxes are an ideal route from a conventional city to a sustainable city.
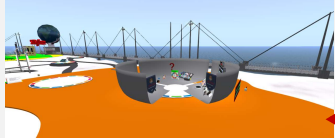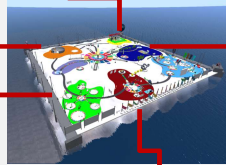
Welcome Area
It is devoted to students' and teachers' training.

Global Issues Scenario
Students approach topics such as:
- ✓ population growth
- ✓ hunger and poverty
- ✓ over-exploitation of resources
- ✓ increase of greenhouse gases
- ✓ loss of biodiversity

Georesources and Circular Economy
In this section the concept of resource is emphasized, highlighting how waste can also become a resource for the production of secondary raw materials. The role of the circular economy in production processes is introduced.

Agenda 2030 and SGDs
This section focuses on the path towards sustainability. All the 17 SDGs and 169 targets are described, defining the three dimensions of Sustainability (economic, environmental and social) and the "5 P" pillars: Planet, People, Prosperity, Peace, Partnership

Environmental footprint indicators
This section shows the concepts and definitions of
- ✓ Water Footprint
- ✓ Carbon Footprint
- ✓ Ecological Footprint
- ✓ Ecological Rucksack

2 Activities

Exploring information & answering quizzes

In each zone students find...

....multimedia presentations, external web link, and quizzes to acquire badges

...interactive 3D objects by clicking

Dealing with 3D objects

Students discover the Water Footprint of a typical breakfast: about 4 bathtubes

Students learn about the actual levels of temperature and carbon dioxide, with respect to the pre-industrial era

Students explore the Ecological Rucksack of water plastic bottles in comparison with fresh water

Students calculate the Water Footprint of their favourite food, and the Water- and Carbon Footprint of daily routine actions

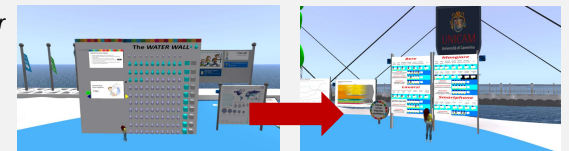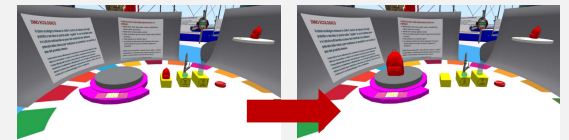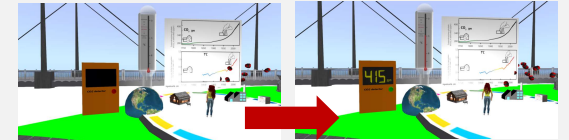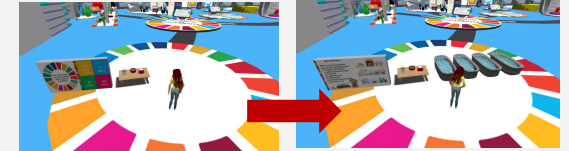**Playing online games**

... online games to deepen topics

Challenging with Sustainable City Game
Alone or in teams, students roll the dice and must face different tasks: individual multiple choice disciplinary tests, online games, digital draws, multiplayer challenges.

3 Approach

- ✓ Game base learning (GBL)
- ✓ Gamification

Virtual World
Techland (platform Opensimulator) owned by M. Occhioni

4 Testing

-**58** teachers
-**650** students from **4** middle Italian schools, **575** respondent students to the post-activity test
- ✓ **136** students accessed to Sustainability Hub as avatar (Group W)
- ✓ **439** participated in sharing screen mode (Group S)

Group S = 1 two-hours meeting; Group W = 2 two-hours meeting (training & experimentation)

5 Results

	Mean test score %			U Mann-Whitney test
	Pre-activity / STD	Post-activity / STD		P value
Total students	50.5 13.9	65.2 16.2		<0.001
Group S		61.8 15.7		<0.001
Group W		76.4 11.9		<0.001

- ✓ High engagement of students
- ✓ Good test results
- ✓ Interactive activities and "sense of presence" during pandemic
- ✓ Improved digital and transversal skills

References

- ✓ Occhioni, M., Beccaceci, A. & Paris, E. (2022). Teaching sustainability topics in virtual worlds. A preliminary study. In *Electronic Proceedings of the ESERA 2021 Conference.*
- ✓ Occhioni, M., Beccaceci, A., & Paris E. (2021) "Teaching sustainability and Agenda 2030 topics in virtual worlds". *EDULEARN 2021 Proceedings.*
- ✓ Occhioni, M. & Paris, E. (2021). Virtual Worlds to Teach Sustainability Topics in Distance, *ECEL 2021-Proceedings*

Sharing is encouraged

SCAN ME