Chapter 14
Techland:
New Educational Paths Focused on Energy Resources and Sustainability Using Virtual Worlds

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ABSTRACT

Techland is a virtual world completely focused on math and science (geosciences, chemistry, biology) for K6-K8 students, which has been well tested for school activities and projects in an Italian middle school. Recently, Techland has made a slowly transition from a general STEM (science, technology, engineering, and mathematics) world to a more specific and contextualized environment, with the aim to apply scientific concepts to the challenge that our society has to face today: climate change, exploitation of raw materials, pollution/remediation, green energy. Themes like circular and shared economy, sustainability, ONU Agenda 2030 Sustainable Development Goals are becoming more and more important in education. Therefore, Techland virtual environments have been expanded and improved and new environments have been created. An interdisciplinary perspective has been adopted to treat environmental themes using an inquiry-based learning methodology (IBL) adapted to virtual worlds and activities based on collaborative building, storytelling (machinima videos), and gamification.

INTRODUCTION

The development model that permeated society during the entire twentieth century, when we had the illusion that our natural resources were endless, has reached a turning point, almost to a point of no return. The question is simple: are we living far above our Planet's ability to provide enough resources for all? Will we be able to reduce waste? For some time now, environmental sustainability, waste man-

agement, decarbonization and renewable energy (Edenhofer et al, 2011) have been considered as the set of solutions that could mitigate climate change and the depletion of natural resources (Ellen MacArthur Foundation, 2013, 2019).

In September 2015 a world committee, ratified by several countries within a United Nations framework, relaunched the so-called "Agenda 2030" development program for the planet to be implemented by 2030 (United Nations, 2015). The seventeen Sustainable Development Goals (SDGs) are all interconnected, in order to leave no one behind and provide an ambitious and holistic reference framework, with the aim of radically transforming society towards the path of sustainability, seeking new societal models compatible with a more conscious consumption of the finite resources available, and regeneration of waste. These goals have been built on the achievements of the Millennium Development Goals (MDGs). In simple terms, the entire concept of Sustainable Development means that we can be sustainable only if we address some important issues involving the economic, environmental, and social fields (Allen et al, 2016).

The challenge is global, everyone is involved. In particular, the 2030 Agenda recognizes the critical role of education as a catalyst for broader change. Education is itself a goal, SDG4 – Quality Education (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all). It aims to grant access to education for all, eliminating gender disparities and to improve the poor conditions of schools in developing countries, to train teachers, to promote technical knowledge and the skills needed to promote sustainable development (UNESCO, 2017). Knowledge, skills, values and attitudes that empower people to contribute to sustainable development are required for people to become sustainability change-makers. Education, therefore, is crucial for the achievement of sustainable development.

UNESCO recommend to plan and run ESD projects (Education for Sustainable Development) in schools and Universities and one of the main topics is "Basic skills and competencies needed in the 21st century" (Dede, 2010), which are necessary to support sustainability. Citizens in the twenty-first century must have the ability to coexist peacefully with the environment. To achieve this, they should have environmental literacy and awareness about the dynamic relationship in which our behavior is constantly affecting and being affected by everything natural and human in the Earth's systems. Over one million school students recently went on strike for climate, inspired by Greta Thunberg (Carrington, 2019) and this demonstrates how much young people are sensitive to the problems our Earth is encountering. A better knowledge of the Earth's structure and dynamic processes, the geo-resources, the natural hazards and the impacts of human activities, can increase their awareness regarding the environmental problems of our planet and their effects on people.

In this framework, ICT (Information and Communication Technologies) can accelerate and improve the approach to the SDGs through formal, non-formal and informal learning (UNESCO, 2017) and promoting low-cost e-learning activities. By granting access to this knowledge to all people in the world, regardless of where they live or how much they earn, ICT also helps to narrow the digital divide between generations and empower communities.

One of the main characteristics of the Agenda 2030 goals is that they are designed to be challenged from a global point of view and in a trans-disciplinary way. So, it is important for young students to approach them with a different perspective, going beyond the single subject and contextualized learning in their everyday life. In this framework, virtual worlds such as ITC's, offer great potential as an effective platform for a variety of collaborative activities (role play, case studies, reconstruction of possible future scenarios, storytelling) to foster learning. This paper describes how virtual worlds can support learning on sustainability, with the aim of:

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