The G.A.STEM Project

April 2019

G.A. STEM European Project

Project partnership

The international partners are:

- EU-Track, Italy
- Istituto Comprensivo Maria Montessori, Italy
- Pixel, Italy
- Rieskalähde Junior High School, Finland
- Sint-Lievenscollege, Belgium
- Tallinn University, Estonia
- Tamsalu Gymnasium, Estonia
- University of Turku, Finland (coordinator)

Background

Research and development (R&S) are defined by OECD-Organization for Economic Co-operation and Development as a **creative work** managed in a systematic way in order to broaden own knowledge about men, culture and society, and therefore, to understand their use and to foresee new applications.

Nowadays, Europe is coping with different international challenges, such as globalization, resource exploitation and human aging. In this framework, as stated in the European Communication EUROPE 2020 - *A strategy for smart, sustainable and inclusive growth of 2010*, the Commission focuses on the application of a stronger strategy which can transform European Union into **a smart, sustainable and inclusive growth** for a high level of employment, productivity and social cohesion.

According to EUROSTAT, about 2,6 millions of people in Europe work in the Research & Development field, but the situation is changing completely at national level for some countries such as Bulgaria, Italy, Greece, Estonia, where the percentage of people working as "scientists and engineers" is very low, around 20%.

Today's youths are more interested in who they will be rather than what they will do. Negative stereotypes of scientists, engineers, researchers and other **STEM (science, technology, engineering and math)** experts' career can be found amongst European youth. There is a lack of attractive role models and a lack of information and understanding of what careers in STEM are about.

Moreover, another problem regarding to the gender differences is highlighted: girls often are not so encouraged to pursue a scientific career. There is a significant **gender issue** in the STEM area, with an insufficient number of girls taking up or being encouraged to take up these subjects.

In this framework, one of the main objectives of the European Ministers is to set the target for the reduction of the average of students with difficulties in reading, math and science in order to reach fewer than 15% by 2020.

Aims

To meet the challenges outlined, the **G.A.STEM** project intends to introduce **ART** to ensure the development of **STEM** skills in 14-16 years old students reinforced by the use of the technology.

A different and interdisciplinary approach is required to develop and promote **STEM** skills of students. The approach is based on the use of innovative tools and methodologies that can guarantee an **active and creative role of learners**. By using it, the learners may test the interconnection of different languages, such as visual, sensory, verbal and non-verbal. An element that will be used as interconnector is the "Art" which supports a **problem-oriented creativity** development, especially in young people.

In fact, **imagination** and **creativity** have always been at the cornerstone and joining factor between STEM and art. These faculties have guided and sustained the science branches during the long millennial development. This assimilation, from the students' side, has always resulted in a certain degree of separation and difficulties.

Therefore, imagination and creativity are potentially capable to recreate the harmony of the integral (holistic) vision of human and cognitive development. **The arts help students connect better scientific subjects and reality by rediscovering their usefulness and their application in everyday life**.

Logic and creativity become essential elements in the learning path in both formal and informal education. This allows students to reinforce their STEM knowledge through the arts to develop systems thinking based on **applicable knowledge**, **imagination**, **creativity** and **problem solving skills**.

In this framework, the STEM education is reinforced and supported by the introduction of the use of the arts, leaving the place to the development of what is called **"STEAM"** **(science, technology, engineering, art, mathematics) education**.

Moreover, thanks to the introduction of the technology, the project intends also to exploit the potentialities emerging from a creative combination and implementation of different approaches in STEAM teaching and learning: **meaningful learning, participatory learning, peer-to-peer** and **immersive learning**.

Objectives

The project's objectives are:

1. Improving **motivation in scientific study** through the use of art-works and creativity and their applications in everyday life
2. Improving **social inclusion and gender equality** by utilizing the attractiveness of art and technology (in terms of mini-games design and game assets).
3. Supporting **STEM skills** (vertical and horizontal) useful for professional careers for both teachers and students.
4. Improving **collaboration and interdisciplinary approach among teachers and schools** in STEAM developing work.
5. Increasing the **community sense and citizenship awareness** through the discovery of European Cultural heritage through art-works introduced in the project.

Actions

The G.A.STEM project focuses on the following actions:

1. Reinforcing teacher skills in the use of ART as development of creativity in their students to promote their interest in STEM education and consequently their interest in scientific careers;
2. Improving the STEM education through the discovery of the connections between ARTS and reality and the promotion of the creativity development in 14-16 years old students;
3. Recombining in a new way the application of the technology to the STE(A)M education through the development and design of mini-games and game assets.

Target Groups

Primary target group: Math, Science, Art and ICT teachers; students near the end of compulsory education (last year of lower secondary school and first year of upper secondary school).

Secondary target group: National School offices; Educational authorities, Secondary schools, Educators.

Impact

The envisaged impact of the G.A.STEM project on the target groups is:

1. on students: **improve mathematical and science literacy skills**, contrasting with the lack of interest among students to start scientific studies and supporting the development of the **scientific culture in European countries**;
2. on teachers: provide innovative contents strictly connected with national school curriculum in mathematics and science in order to **improve the quality of teaching**, support a more flexible and fun training in addition to the face-to-face and **reduce the number of low performs of students**.

Meetings

The kickoff meeting was held on 19 – 20 December 2018 at Turku (Finland). During the first meeting, the European project partners introduced themselves as well as their project's related experiences and expertise. The main activities to be carried out were presented and discussed. The main intellectual outputs to be produced were examined and the templates for the production of the expected deliverables were analyzed and jointly discussed.