

## Developing Innovative Science Outreach for Vocational Education to Encourage STEM Careers and Education (DISCOVER)

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Dear Reader,

This is the second e-bulletin of the DISCOVER project. Our project seeks to facilitate the design and delivery of science education at secondary school level. In a series of e-bulletins we will present the progress of our work and the resources for science education that we develop.

Society is looking up to both schools and other stakeholders to find solutions to address the failure of the school system to provide good scientific training and to arouse scientific curiosity among young people. Some possible solutions relate to changes in teacher training or in the compulsory curricula. This project, however, is interested in a different approach: facilitating and improving extracurricular educational activities carefully targeted at promoting and communicating science among high school students. The efforts of the DISCOVER partner organizations are geared in this direction. We hope that our work will raise awareness of the responsibilities of different stakeholders to create conditions for effective and inspiring science training and will motivate and equip educators to design, implement and scale science education opportunities for Europe's young people.

Yours Sincerely,

The DISCOVER Project Team

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## RECENT ACTIVITIES

### Third Project Meeting

The project's third collaboration workshop was hosted by Marconi University in Rome on September 26-27, 2018. It was focused on collaborative work on three of the DISCOVER outputs.



## **HIGHLIGHTS FROM THE DISCOVER GOOD PRACTICES OF SCIENCE OUTREACH**

### **1. Short-term STEM education activity involving business, university students and secondary education students**

*This is a university-led good practice whereby the university brings together business, university students and secondary education students in a STEM education activity that provides space for showcasing young scientists' achievements, while also allowing them to meet with representatives of business.*

Case study: Days of the specialty at Technical University – Gabrovo, Bulgaria

### **2. Opening research labs to students**

*This a very basic form of science outreach that allows secondary education students to visit university labs or labs at research institutions, get acquainted with scientific equipment, meet university researchers and get a taste of scientific work*

Case studies: Open Doors Days at Technical University – Gabrovo, Bulgaria; Open Doors Day at the Faculty of Mechanical Engineering at Technical University of Košice – Slovakia; Annual Open Day at Technical University of Crete – Greece

### **3. Educational outreach university laboratories**

*This is a university-led or research institute-led practice whereby the university/research institution invests into the establishment of a basic scientific lab within a partner school and commits to providing outreach educational activities in this lab.*

Case Study: Equipment of a joint university-school laboratory in a vocational school - Technical University – Gabrovo and the John Atanasov Vocational High School – Stara Zagora



#### **4. Science communication event for the general public, involving students and their parents**

*This a university-led or research institution-led practice involving the organization at local level of a science communication event for the wide public during which technologies, equipment, research results and scientific issues are presented and demonstrated.*

*For the practice to have a perceptible STEM promotion impact, it should allow for intergenerational learning and communicate science to both young people and parents (in view of encouraging parents to support their children to pursue a STEM career or study). For an even stronger impact, the practice may provide possibilities for high school students to present, exhibit or otherwise contribute to the event as active participants, creators or co-creators (as opposed to just being spectators), e.g. through dedicated workshops, exhibits and sections.*

Case Study: Annual Science and Technology Day – Technical University of Crete, Greece

#### **5. Robot Programming Competitions**

*This is a university-led or research institution-led good practice that consists of organizing a Robot programming competition for high school students, using existing university Robot equipment. The competition may or may not be preceded by training, depending on the target group:*

*Students with well-developed skills in programming would not need training. The focus for such a target group could be on promoting excellence through the competitive element and on choosing an interesting challenge (the task that the robot should be programmed to perform). This format can support development of advanced programming skills and promote commitment to STEM career.*

*Students without well-developed skills in programming would benefit from training, while the competition element should be more focused on practicing the learned skills than on showcasing achievement and excellence. This format would be more suitable for sparking interest in Robotics and improving general programming skills. Both formats can be regarded as good practice.*

Case Study: Programming Your Robot competition– Technical University of Košice, Slovakia

## **6. Giving secondary students access to researchers, laboratories and research processes**

*This is a university-led or research institute-led good practice whereby the universities/research institutions allow secondary school students to experience first-hand research in laboratory settings and/or engage in researcher-led training in and out of the Lab. The practice aims at providing a taste of what it is to be a researcher and at improving the self-confidence and motivation of young students to engage with science.*

Case Study: Young Chemist's School and Chemistry Research Internships for young students - The Association of Students and Graduates of the Faculty of Chemistry of the Warsaw University of Technology "Klatrat", Poland

## **7. Organizing at national level a large-scale science festival focused on a specific scientific area**

*This is a university-led or research institute-led practice for science communication that consists of the organization of a high-visibility entertaining science demonstration event in a particular scientific area. The event should target the scientific and industrial communities, as well as the general public.*

Case Study: The Night of Robots – Industrial Research Institute for Automation and Measurements (PIAP), Poland

## **8. Organization of Shadow a Scientist activities of short-term duration**

*This is a university-led or research institute-led good practice whereby the university/research institution invites high school students to shadow a scientist, researcher or a graduate student while they conduct real-world research at the laboratory. The activity would typically last a few hours. The practice brings students into contact with researchers (as role models), laboratory equipment and the process of research. It has the objectives to demystify scientific work, spark interest and curiosity in science, and build students' confidence in engaging with science themselves.*

Case Studies: Shadow a Scientist Program - University of Texas, USA; Inspiring Future Scientists through Shadowing – Department of Chemistry at Stanford University, USA

## **9. Creation of collaboration and co-creation spaces nurturing innovation and entrepreneurship and encouraging cross-fertilization and collaboration of the Arts, Science, Technology, Engineering and Maths (STEAM) sectors**

*This practice involves creation of a space (center) for collaboration and co-creation bringing together the scientific community, educational institutions and their students, business, industry and the local community in order to encourage creativity, interdisciplinary research and innovation through knowledge exchange between the STEM sectors and the Arts & Design sector. The approach ultimately links STEM to both Arts & Design and Entrepreneurship.*

Case Study: STEAMhouse, Birmingham, UK

## WHAT IMPACT WE SEEK TO ACHIEVE WITH THIS PROJECT

- Increased student motivation to pursue a science-related career or study science
- Introduced innovations in extra-curricular, co-curricular and curricular science education
- Improved quantity and quality of science outreach activities and non-formal science education for learners in secondary vocational education, and stronger engagement and co-creation in such activities by a variety of actors, including university students and industry
- Strengthened capacity for university-school partnerships in the vocational education sector and for science outreach and communication on the part of universities

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