

# STEM EDUCATION

## Standard Operating Procedures

Version: 2024

*The STEM Education Standard Operating Procedures states the minimum requirements that a Host Country must follow when organizing national finals. It also serves as a guide to STEM Education National Organizers.*

*This SOP is approved by STEM Education Board of Trustees based on input and advice from STEM Education Advisory Council.*

*Responsible editor is the STEM Education Secretary General.*

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### INTRODUCTION

**Heraclitus of Ephesus**, a pre-Socratic Greek philosopher, was most famous for his insistence on ever-present change, or flux or becoming, as the characteristic feature of the world, as stated in the famous saying, "No man ever steps in the same river twice" as well as "**Panta rhei**", **everything flows**.

### MAIN ORGANISER

Non-profit organization WRO Hellas <https://wrohellas.gr/> is the main entity conducting robotics competitions in Greece and South East Europe, as well as the legal National Organizer of World Robot Olympiad in Greece. Founded in 2009, WRO Hellas aims at introducing teachers, students and parents to educational robotics and, more broadly, to the STEM philosophy. In this framework, we use our robotics contests as leverage in order to ensure that every school is not only willing but also able to take its first steps into STEM, either by enriching its official curriculum or by offering appropriate after-school activities. We do this by creating motives and ways for schools to obtain free infrastructure, by supporting teachers with free, continuous hands-on training, as well as by developing open-access lesson plans for elementary and secondary teachers.

Our 16-year history began in 2008, when the first, informal core team of friends, stakeholders and supporters was formed, sharing the common vision of introducing educational robotics and STEM into the educational reality of Greece. Even at that time,

the forming community of WRO Hellas was nationwide and included academics, school counselors, elementary and secondary teachers, and parents. How to participate in the competition final is what we will describe in this section of the ROES Standard Operating Procedures.

The coordinated steps taken ever since by like-minded people from all over Greece, achieved to turn robotics from an unknown concept, into a strong educational trend that attracted more and more Greek schools. Building on a comprehensive methodology whereby knowledge was widely spread to all teachers and students, we have managed to quickly improve the quality level of Greek teams participating in the World Robot Olympiad and achieve some notable rankings and accomplishments that have since put Greece at the forefront of educational robotics and STEM at a global level.

### **STEM Education COMPETITION**

The educational robotics competition is an exciting journey that seeks to encourage students and teachers to build some crucial skills such as teamwork, problem solving, engineering and programming. What is more, in the framework of the contest, WRO Hellas supports the educational community with robotics infrastructure, continuous hands-on training, as well as full-scale lesson plans and guides for elementary teachers - all the above, free of charge.

In 2024's, the competition invites school students (aged 6-16) & educators to form teams of 3-6 students and then design and build a complete robotic construction model, according to the theme "Can we survive on Mars?". After exploring planet Mars teams are invited to pick their favorite invention, 'tease' it by either changing the form of energy it uses to operate or the way it is controlled (from mechanical to programmable). Ultimately students should develop their own inventions that fit into a broader functional theme and incorporate technologies of our time. The young inventors of the 21st century are among us!

On the day of the competition, participating teams may bring their robotics structure ready from their home. The only thing that they are asked to do is prepare their booth and present their project to the judges, who will later evaluate it. The judges will evaluate both the concept of the project, and the development of the project's code (software).

It is essential for children to be introduced to **STEM** at a young age. This way, they will be able to explore the knowledge step by step, starting from simple machines and mechanisms and gradually reaching to building and programming complex robotic models. Simultaneously, they will acquire abilities such as problem solving, innovation and project management, crucial for their career in the 21st century.

### **THE AIM OF STEM Education COMPETITION**

The starting point to a career in STEM related professions is developing the desire to explore the environment and the curiosity to understand the laws of nature at a very young age. After achieving that, the program will focus on Engineering and Coding, the two pillars that constitute the foundation of Educational Robotics. These will become the tools to innovate and design solutions to certain problems that have never been solved before. Needless to say that,

65% of today's students will have jobs that have yet to be invented.

The confirmation of the students' effort comes through the path to the Educational Robotics Competition. Teamwork, self-confidence, problem solving, alternating roles are the most important concepts explored through the participation in the competition, the theme of which changes every year to mirror the current state of the world or a pivotal age of history.

Based on our experience, know-how and good practice that WRO Hellas has developed in Greece becomes the tool that the participating countries will use in order to implement these good practices in their country. Specifically, towards understanding technology, which is the fundamental of STEM, educational seminars will be organized with content that will be developed by WRO Hellas based on its more than 10 years of experience and which will be addressed to students of the first three grades of primary school. At the same time, a similar program where, in addition to technology, students will also understand the introduction to automation will be developed for students of the last three grades of primary school.

### **FUTURE FOR STEM Education**

The benefits for the students are huge since they will acquire the skills necessary for the 21st century, such as teamwork, self confidence etc. As far as teachers are concerned, they will be given the opportunity to gain additional knowledge and at the same time to change the educational model from instruction to construction. National competitions will enable students to understand in a competitive environment concepts such as problem solving, project sustainability, presentation and selfassessment.

As **National Coordinators** you are asked to:

- disseminate before, during and after the Competition to your educational community of your respective country
- organise the National Competition in your country
- participate annually to the Final Competition as official representative.

Our ambition is for the rest of the Balkan countries to participate in the competition in the coming years by adopting educational programs based on STEM methodology, as well as by participating in the competition. This will be the future goal, for the Balkan Peninsula to become the center of innovation and technology. The theme of the competition will be announced in October 2024, allowing the teams a long period of preparation until April 2025, when the competition will take place in each country. After the conclusion of the national competitions, the Consortium will meet to exchange practices and ideas about the effort of the teams and trainers and ultimately organize the Balkan Educational Robotics Competition, where top teams from all country-members will be eligible to participate.