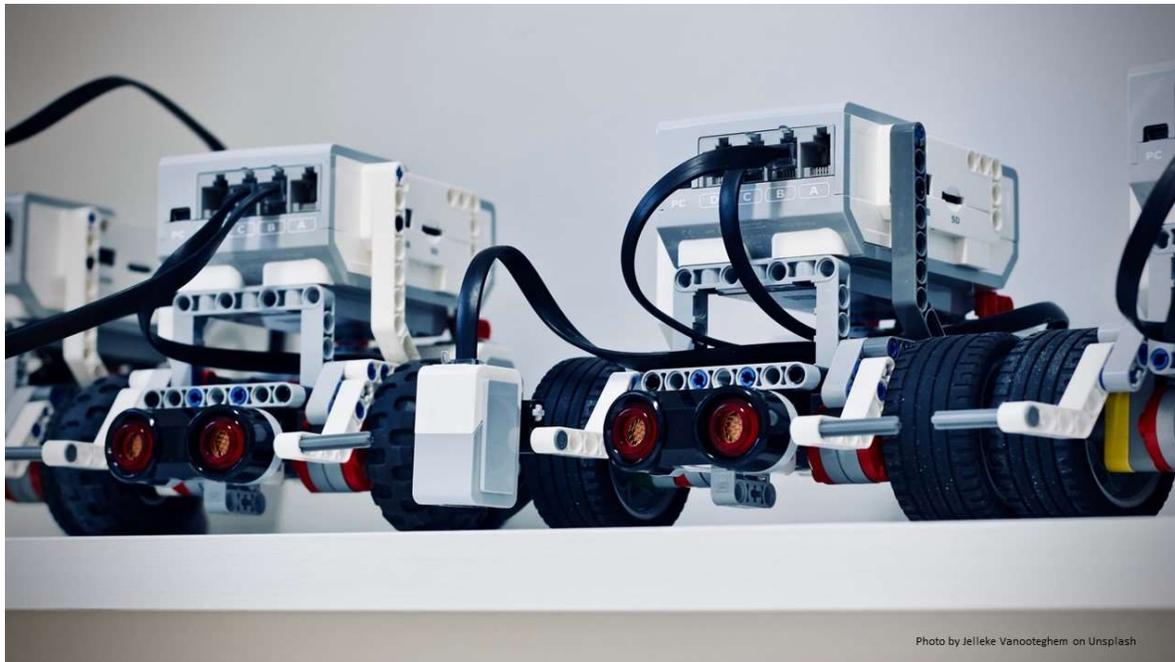


# ROBOTics Learning for empowering the new GENERations of EU Innovators

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## ROBOGENIUS Training kit

*Short version*

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## Executive summary

The ROBOGENIUS project “ROBOTics Learning for empowering the new GENERations of EU Innovators” project is an Erasmus +.KA2 initiative which is EU funded and addresses both students at pre-university education level (general education and VET) and teachers involved in the educational process with the mentioned students via the use of the Lego® Mindstorms® platform.

**WHAT:** a workshop that not only trains on robotics but on transversal skills

**WHY:** because we need to be ready and flexible within this ever-changing world

**WHO for:** this train the trainers program will allow them to transfer to scholars

An example of a workshop schedule:

	DAY 1 (May 28th)	DAY 2 (May 29th)	DAY 3 (May 30th)	DAY 4 (May 31st)	DAY 5 (June 1st)
9h		Sensors	Switch Tutorial	Loop + Interruption	
9:30h	Onboarding + Initial Test	Mini Challenge 5			SPECIAL CHALLENGE
10h	Sound + Screen Tutorial	Sensors, part 2	Mini Challenge 8	Mini Challenge 10	
10:30h	Mini Challenge 1	Mini Challenge 6			
11h			BREAK		
11:30h	Movements	Sensors, part 3	Switch Tutorial, part 2		
12h				Summary	
12:30h	Mini Challenge 2	Mini Challenge 7	Mini Challenge 9		Wrap Up and Final Test
13h					
13:30h	LUNCH TIME				
14h					
14:30h	Large Motor Tutorial	First Challenge	Second Challenge	Third Challenge	
15h	Mini Challenge 3				
15:30h					
16h			BREAK		
16:30h	Medium Tutorial	First Challenge	Second Challenge	Third Challenge	
17h	Mini Challenge 4				
17:30h			Daily Test		

1	Move Steering
2	Move Tank
3	Large Motor
4	Medium Motor
5	Sound+Screen
6	Waiting
7	Loop + Interruption
8	Switch
9	Color Sensor
10	Infrared Sensor
11	Touch-sensitive Sensor

EDUCATIONAL ROBOTICS WORKSHOP  
By COOKIE BOX  
BARCELONA, 28-29-30-31 of May and 1st of June (2019)

## ROBOGENIUS PROJECT

<http://robogenius.mysch.gr/en/home/>



The full version of the outcome includes the chapters listed below, with the following content:

**ROBOTS** – the chapter includes different definitions of a robot, its general structure and the description of the Central Processing Unit (CPU)

**The Lego® Mindstorms® EV3 Set** – general description of the EV3 Set Home Edition

**Components** – the chapter describes the bricks included in the kit, as well as the large and medium motors, the sensors (color, touch, IR).

**The IDE (the programming environment)** – the free download link <https://www.lego.com/en-us/mindstorms/downloads> and the Blocks' categories: Action Blocks, Flow Blocks, Sensor Blocks, Data Blocks, Advanced Blocks, My Blocks.

**Activities/Challenges** – this chapter is split per levels, each level having allocated challenges with a relevant level of difficulty:

*Easy level* with the following challenges:



1. Sound & Screen - Blocks
2. Movement - Steering & Tank: Just walk; Translation turn; Pivotal turn; Non displacement turn
3. Movement - Large Motor - Blocks
4. Movement - Medium Motor - Blocks
5. Sensors - Wait & Infrared - Blocks
6. Sensors - Wait & Color - Blocks
7. Sensors - Wait & Touch - Blocks

*Medium level* with the following challenges:



1. Sound & Screen - Blocks
2. Movement - Steering & Tank
3. Movement - Large Motor - Blocks
4. Movement - Medium Motor – Blocks
5. Sensors - Wait & Infrared - Blocks
6. Sensors - Wait & Color - Blocks
7. Sensors - Wait & Touch - Blocks
8. Switch & Loop - Blocks

*Advanced level* with the following challenges:



1. Sensors - Wait & Touch - Blocks
2. Switch & Loop - Blocks

**Building a memorable experience** – the chapter includes information related to several aspects such as: the importance of roles; promoting interaction among robots; the “gamejam” concept; cooperation and competition among teams; the importance of narrative and storytelling; some tools; interesting related videos.

**The Robogenius Gamification kit** includes templates and examples of materials to be used during a similar training session, such as: badges (Personal Accreditation); Team/Table ID; Coin system; Floor Boards Challenges; a Deck of gamification cards (Action cards and Role cards).

#### **Photos taken during the training activity implemented in the project**

**Conclusion and recommendations** – the chapter presents the conclusions of the partners of The Netherlands and Greece after their participation in the Robogenius training course, as well as recommendation from the partners from The Netherlands, Greece, France and Romania for organisations willing to organise similar training activities with their target groups.

## Conclusion and recommendations

### Conclusion

#### *Quarter Mediation (Netherlands)*

The fact that the course in Spain was organised with the participation of the representatives of all the ROBOGENIUS partners was extremely beneficial for the project, the main reason being the fact that in this way different types of organisations were involved (e.g. adult education providers, association, schools) and all levels of education were targeted and reached (e.g. primary education, secondary general education, vocational education, tertiary education, adult education). In this respect, the feedback received from the participants in the training activity in Spain, both via observation and as a result of discussions, was helpful in designing the curriculum for a training course for teachers and trainers working with students at different education levels (e.g. primary, secondary, tertiary, adult education). Moreover, the good results of the training course in Spain were a guarantee that the use of learning-by-doing, gamification and ICT with the help of electronics, sensor technology and Lego educational are beneficial in improving learners digital and life skills together with the development of the skills and competencies targeted through their education.

#### *1o Epaggelmatiko Lykeio Peramatos (Greece)*

The course used challenging exercises with gradually increasing difficulty; gamification principles (rewards, upgrades by luck with the use of dice, purchase of time/ extra tools, gathering of points, use of “story cubes”, competition between groups); interdisciplinary and student-centered approach that cultivates a wide range of skills, both “hard” and “soft” ones.

### Recommendations

#### *Quarter Mediation (Netherlands)*

Based on the experience of the course in Spain, in case other organisations at any level of education are willing to organise similar training courses, it is very important to adapt the course content and its length, as well as the training methods, to their target groups, to their learners background, abilities and specific educational needs. For example, in case the group of learners does not have experience in electronics and the time allocated for the training activity is short (e.g. one hour), the trainer must focus on the importance of the use of ICT and gaming in the learning process by giving concrete examples and easy tasks to the learners. In this way, the self-confidence of the trainees will increase, as well as their willingness to learn. On the other hand, if the group of learners has relevant knowledge of electronics and programming, the focus can be placed on the challenges and tasks with a higher level of difficulty can be assigned.

With regard to the gamification techniques, even though it is true that through competition some teams and/or people will be more motivated than others, it is also true that failing can demotivate other teams and/or people. Given this, another important advice is to focus less on competition with groups that learn something for the first time.

### *1o Epaggelmatiko Lykeio Peramatos (Greece)*

Programming “Lego Mindstorm” could be used during the lesson “Creative Activities” that is integrated in the greek upper secondary education in an interdisciplinary way. A combination of linguistics (through creating a story) and robotics intrigues the interest of the pupils and offers a holistic learning.

It is also appropriate for the lesson under the name “Project” which is based totally on the project learning method and carried out by the pupils in groups. The teachers can integrate “Lego Mindstorm” programming in every topic the pupils choose to engage with. Creativity both of pupils and facilitator is required for executing tasks relevant to the topic they research.

It could give new dimension to theoretical lessons such as Greek language/Literature and modern History by reconstructing a story/character with the use of robots.

It is easily combined with Physics and Maths, especially geometry, as the programming of multiple moves requires a very good knowledge of these subjects.

### *Boreal Innovation (France)*

Suggestions on how to use the training kit:

- to stimulate the imagination of the members in the target group and make them able to build various and spectacular Lego characters which they can use to create stories that could make the robogame become interesting and attractive.
- to diversify the type of tasks which the robots are meant to accomplish by the addition of new spare parts and sensors or change the the robot programming in order to improve it.
- to make as many students as possible get involved, by selecting the ones who are gifted, motivated, imaginative and committed to working with robots.
- to create a "learning chain", a "cascade learning" in which older students who are already accustomed to working with robots are encouraged to pass on their learning to other students who are new in this field.

### *Asociatia de Studii Socio-Economice (Romania)*

Before the training course, make sure that you have the structure of it; make a list of the most important aspects (issues) that you will go through during the entire course; this will help guiding you in achieving your goals.

Introduce your course to the attendees with the help of a simple, digestible presentation, which will be the way of getting their undivided attention.

Involve activities related to STEM education that will lead to a more relaxed and conducive learning environment.

Create a schedule that should be followed closely to ensure you have enough time to fit in all aspects of the training you've spent time outlining e.g. time management.



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