

CODESKILLS 4ROBOTICS

COMPETENCE FRAMEWORK

CODESKILLS4ROBOTICS: Promoting Coding & STEM Skills through Robotics: Supporting Primary Schools to Develop Inclusive Digital Strategies for All

IO1: Building the CODESKILLS4ROBOTICS Competence Framework: From Theory to Practice

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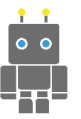


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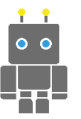
MODULE 1: DEVELOP BASIC STEM SKILLS AND PROGRAMMING

Main Objective	Introduce Primary School Teachers to the world of Robotics and Coding using Lego Boost
Learning Outcomes	<ul style="list-style-type: none"> - Learn how to build REA the robot - Learn how to program REA using Lego Boost Creative Canva Coding environment - Learn about the basic principles of coding such as Sequences, Selection and Iteration and the use of variables - Learn how to program the robot to move - Learn how to use sensors (colour, sound, distance) - Learn how to program the robot to identify objects - Learn how to program the robot to recognize colors from a given range - Learn how to measure the amount of light reflection - Learn how to program the robot to produce sound - Learn how to use the remote control to trigger movements - Learn how to use gears in order to change the speed and torque of the robot - Learn how to use variables and operators
Knowledge	<p>Students should be able to:</p> <ul style="list-style-type: none"> - Understand the use of electronic parts: Move Hub, Color Distance Sensor, Interactive Motor - Understand the use of the sensors and how they work - Understand the different programming blocks <ul style="list-style-type: none"> o Yellow blocks to control the flow of a program o Orange blocks for the color and distance sensor o Green block for movement o Purple blocks to play sounds o Blue & turquoise blocks for special actions, e.g. forcing Vernie to dance o White & light-purple blocks for further programming, e.g. a random number generator (integers between -9999 and +9999)



	<ul style="list-style-type: none">○ Create sub-programs by grouping several actions in one block- Understand the three types of loop blocks<ul style="list-style-type: none">○ For Loops which repeats code for a specific number of times○ While Loops which requires a condition to be true in order to repeat a piece of code○ Forever Loops which repeat a piece of code forever- Understand how the IF/ELSE blocks work- Understand how gears can be used to change the speed and torque of the robot- Understand what a variable is- Understand how to use variables and operators
Skills	<p>Students should be able to:</p> <ul style="list-style-type: none">- Use and connect different Lego pieces- Identify ways to assemble technic and electronic parts using Technic pins & connectors- Build the recommended robot (REA) using different Lego pieces by following the step by step instructions- Use the drag-and-drop environment of the accompanied App- Create new programs using the LEGO BOOST Creative Canva Coding environment- Use the different programming blocks for developing a program using the LEGO BOOST App- Use a combination of blocks in order to move REA (green blocks) forward/backward in straight line<ul style="list-style-type: none">○ Use a combination of blocks in order to make REA turn to the left/right by setting the desired number of degrees- Use the different blocks for Looping commands (yellow blocks)- Build the Color and Distance sensor- Use the detect objects block (orange blocks)<ul style="list-style-type: none">○ Use a combination of blocks in order to make REA detect objects and colors○ Use a combination of blocks in order to allow REA to make decisions based on the sensor's input- Use a combination of blocks in order to produce a sound (purple blocks) when a criterion is met- Use the remote control in order to trigger motion- Use the light sensor in order to measure the reflected light intensity and make REA move on a predefined path-line- Use gears in order to change the speed and torque of the robot- Use variables (white blocks) to program REA

	<ul style="list-style-type: none"> - Use operators to program REA
Soft Skills	<ul style="list-style-type: none"> - Team work - Collaboration skills - Communication skills - Ideas Exchange - Project management - Coordination - Observation - Time management - Planning/Scheduling - Listening - Problem Solving - Decision making - Experimenting - Focus - Goal setting - Memory - Presentation skills - Creativity
MODULE 2: THE CREATIVE SCENARIOS	
2.1 BUILDING AND PROGRAMMING SMALL ROBOTS	
Main Objective	Overview of the standard models in the Toolbox: Vernie the Robot, MTR4, Frankie the Cat, Guitar 4000 and the AutoBuilder.
Learning Outcomes	<ul style="list-style-type: none"> - Learn how to build and program Vernie the Robot - Learn how to build and program MTR4 - Learn how to build and program Frankie the Cat - Learn how to build and program Guitar 4000 - Learn how to build and program the AutoBuilder - Learn how to use the standard models as reference guide, to expand on further ideas and create programs
Skills	<p>Students should be able to:</p> <ul style="list-style-type: none"> - Identify the available tasks and programs recommended by Lego - Use the standard models as a reference guide, to expand on further ideas and create programs



	<ul style="list-style-type: none">- Add own techniques and imagination to extend programming options beyond the original suggestions- Customize own ideas and program them, using a combination of movements and sensor abilities
Soft Skills	<ul style="list-style-type: none">- Team work- Collaboration skills- Communication skills- Creativity

2.2 THE FOUR (4) SCENARIOS

2.2.1 CULTURE SCENARIO - Music and Culture Scenario

Main Objective	<p>In this scenario, students will learn about culture and folk music. They will construct and program the Guitar Robot.</p> <p>The students will learn how to play a simple tune with the help of the Robot Guitar. They will find the tone A with 440 vibrations per second. Students will learn about how people created simple instruments that then evolved into what we today recognize as modern musical instruments. The Robot Guitar will be an introduction to synthetic music. A genre that many young people listen to and have an interest in.</p> <p>Pre-Requisites</p> <p>Students should have basic knowledge on music theory. What a major scale is and how does it sound like? Students should also know about the regional folk music in the area and traditions connected to the music.</p>
Learning Outcomes	<ul style="list-style-type: none">- Students learn about the history of musical instruments.- They see the connection between The Robot Guitar and modern synthetic music.- Students learn about notes, minor and major chords.- Students learn about folk music in different countries.
Knowledge	<ul style="list-style-type: none">- Develop knowledge about music history- Develop knowledge about musicality
Relevant Subject	<ul style="list-style-type: none">- Mathematics- Music
Soft Skills	<ul style="list-style-type: none">- Creativity

	- Team work
2.2.2 HISTORY SCENARIO - Talos: From the Legend to Modern Robots	
Main Objective	<p>In this scenario, students will be introduced to the legend of Talos. They will construct and program a Robot just like the mythical guardian of Crete. Finally, they will discuss issues related to the protection and preservation of important cultural and historical sites.</p> <p>Pre-Requisites There are no cognitive prerequisites.</p>
Learning Outcomes	<p>Pupils will:</p> <ul style="list-style-type: none"> - calculate the perimeter of the island of Crete and the speed of Talos - construct the robot - get familiar with the sensors of the robot and how to use them
Knowledge	<ul style="list-style-type: none"> - learn simple movement commands - Be introduced to the legend of Talos and the geomorphology of Crete
Relevant Subject	History
Soft Skills	<ul style="list-style-type: none"> - develop their imagination and creativity through the construction of the robot - develop team working skills
2.2.3 SPACE SCENARIO - Robot From Earth to Space	
Main Objective	<p>In this scenario, pupils will get to know the planets of our Solar System and program the robot in order to explore them. Finally, they will discuss issues related to space exploration, the difficulties, the changes that such an action will bring about and its impact on Humanity.</p> <p>Pre-Requisites There are no cognitive prerequisites.</p>
Learning Outcomes	<p>Pupils will:</p> <ul style="list-style-type: none"> - get to know the planets of the Solar System

	<ul style="list-style-type: none"> - build the robot - get to know the robot sensors and how to use them
Knowledge	<ul style="list-style-type: none"> - calculate the distances between them and the difficulties of traveling to another planet. - learn simple movement commands
Relevant Subject	Astronomy
Soft Skills	<ul style="list-style-type: none"> - develop their imagination and creativity through the construction of the robot - develop teamwork skills
2.2.4 ENVIROMENTAL SCENARIO - The Environmental Facility	
Main Objective	<p>Students learn about the environment and the importance of sorting the waste that humans create.</p> <p>The students will build the robots Vernie and M.T.R.4 for inspiration and use them in different activities concerning the scenario environment.</p> <p>Pre-Requisites Students should be able to understand what recycle means, how people recycle and what is the expected impact. Students may make a study visit to the local recycling station.</p>
Learning Outcomes	<p>Pupils will:</p> <ul style="list-style-type: none"> - be introduced to the recycling scenario - construct the Robot - get familiar with the sensors of the robot and how to use them
Knowledge	<ul style="list-style-type: none"> - learn simple movement commands - learn about recycling stations and how waste products are transported to the station
Relevant Subject	<ul style="list-style-type: none"> - Biology - Social science
Soft Skills	<ul style="list-style-type: none"> - develop their imagination and creativity through the construction of the robot - develop team working skills