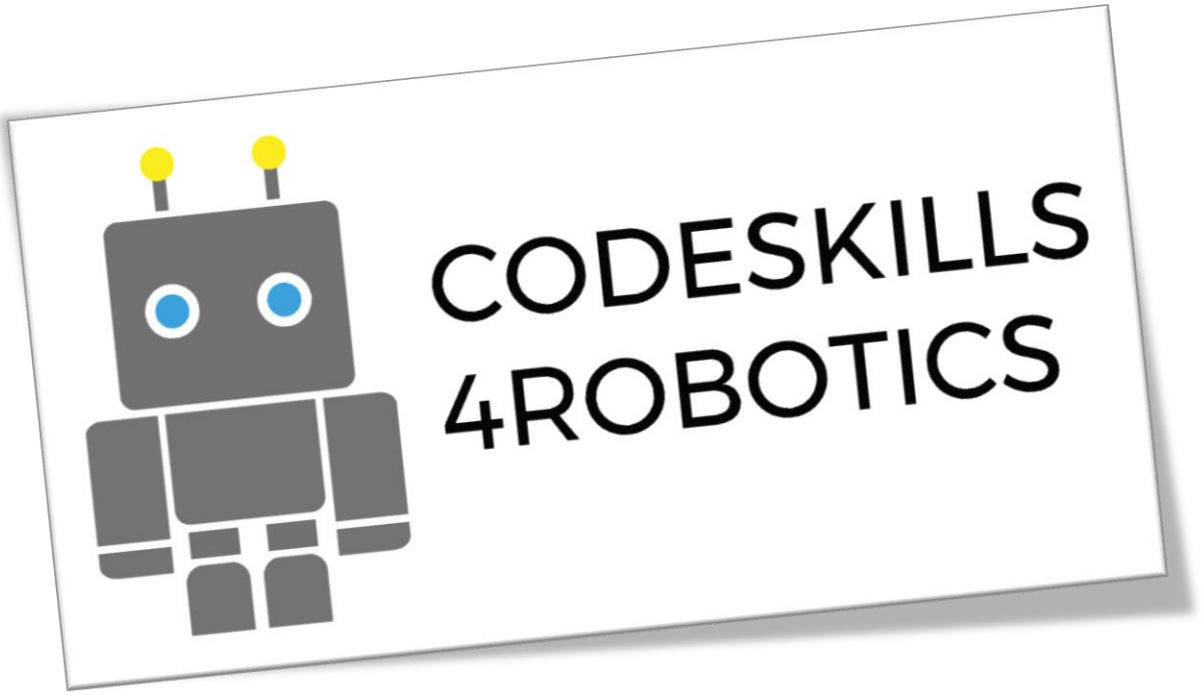

TOOLKIT REPORT

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

IO5: The Toolkit for Setting up the DIGITALSKILLS@SCHOOLS Clubs as Part of the Digital Action Plan - The CODESKILLS4ROBOTICS in Schools

Partner: Regional Directorate of Primary and Secondary School Education in Crete (Greece), Halsingland Education Association (Sweden)

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CODESKILLS 4ROBOTICS

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1. CODESKILLS4ROBOTICS Project Consortium

The CODESKILLS4ROBOTICS Consortium consists of six (6) Organizations from four (4) European countries (Figure 1):

P1	GR	National Center for Scientific Research "Demokritos"
P2	BE	Lifelong Learning Platform
P3	GR	Regional Directorate of Primary and Secondary School Education of Crete
P4	CY	Emphasys Centre
P5	GR	Hellenic Mediterranean University
P6	SE	Halsingland Education Association

2. Introduction

Educational Robotics and Education

21st Century Education: The Role of Skills and Educational Robotics

For the past twenty years, 21st century skills have been at the heart of significant educational reform efforts in several countries around the world (USA, Australia, Finland, etc.). Among the suggested skills for the 21st century, critical thinking, problem solving, communication, collaboration, digital literacy, creativity and innovation are the core skills for students' future success in life.

Many researchers are favorably disposed towards the idea of teaching 21st century skills from the first grades of primary school to both formal and informal education (DeJarnette, 2012; Voogetal., 2013). In addition, the application of active learning methods supports and facilitates self-regulated learning and helps students develop the aforementioned skills (Bell & Kozlowski, 2008). Nevertheless, most standard primary and secondary education curricula do not place much emphasis on applied skills development practices and actions, such as creativity, problem solving (Pellegrino & Hilton, 2012), and digital competence.

In the last two decades, various studies in the field of educational robotics (ER) in primary and secondary education have shown that the involvement of students with educational robotics applications can help them cultivate basic skills that future citizens must have as well as empowering them in the so-called "21st century skills" (Eguchi, 2013; Afari & Khine, 2017). Students develop their personal skills, such as self-confidence; they become better at problem solving, communication, at selecting and evaluating the information; they become more

creative, make decisions and improve features of teamwork (Khanlari, 2013, Hussainetal., 2006; Nugentetal., 2010; Arleguietal., 2008; Demetriou, 2011).

Educational Robotics: Teaching and Learning Support

Exploring people's perception of robots as effective support tools in the learning process is becoming all the more expedient nowadays, due to the constant technological advancement and the expanding role of educational robotics. The educational community expresses more and more interest in the use of robotic technologies, as they rapidly develop, to support teaching and learning (Gorakhnath & Padmanabhan, 2017; Socratous & Ioannou, 2019; Anwar et al, 2019). Using robots encourages teachers and improves learning, making teaching more engaging and students more motivated (Khanlari & Kiaie, 2015). Many researchers have studied the ways in which this can be achieved (Gorakhnath & Padmanabhan, 2017, Socratous & Ioannou, 2019 & 2020, Mubin et al. 2013, Afari & Khine, 2017, Faisal, Kapila & Iskander, 2012, Anwar et al, 2019), claiming that using robots effectively can benefit education to a great extent.

Robots can take on different roles and participate in the learning process at different levels depending on the content, the teacher, the type of the student and the nature of the learning activity. On the one hand, they can take on a passive role and be used as a learning tool or a teaching aid. This is true especially in the field of educational robotics, where students build, create and program robots. On the other hand, a robot can take on the role of a teacher, a partner or a peer in the learning process (Mubin et al, 2017) and supports students' spontaneous participation and reflection in active ways (Okita, Ng-Thow-Hing & Sarvadevabhatla, 2009). Educational robotics can be employed in

education as an innovative educational tool, within a social constructivism and constructionism spirit, to support teaching and learning through hands-on activities in an inviting and supportive learning environment (Socratous & Ioannou, 2019), Mubin et al. 2013) and as a valuable tool to help students develop both cognitive and social skills at different school levels (Lathifah, Budiyanto & Yuana, 2019, Alimisis, 2013, Afari & Khine, 2017). Mastering Robotics has a potential impact on student's learning in different subject areas (Science, Technology, Engineering and Mathematics). Furthermore, there is a wide variety of options to include robotics in the curriculum within an interdisciplinary framework. (Alimisis, 2013, Afari & Khine, 2017). For example, students can create and use robots to help them understand the characters and the plot of the books they read. In addition, they also promote personal development, including cognitive, metacognitive and social skills, meeting the needs of the 21st century workplace (Afari & Khine, 2017). Authentic activities give the students the opportunity to understand real world problems and apply learning and skills into real-life situations (Afari & Khine, 2017).

Not many fields of knowledge incorporate **creativity** and **fun** simultaneously. Studies have shown that robotics promotes both. Moreover, **hands-on learning** activities enhance concentration and attention levels, because the more students learn physical skills, through topics that are interesting and relatable to them, the more they participate during lessons (Faisal, Kapila & Iskander, 2012). They learn to move forward with determination being engaged in quite a complex programming process that incorporates a range of skills, thus promoting a learning environment for people with different talents and learning styles (Faisal, Kapila & Iskander, 2012), arousing their interest and curiosity (Rubenstein, Cimino, Nagpal, & Werfel, 2015) and promoting a culture of teamwork. It can also be used to help students who may have difficulty in understanding abstract concepts (Eguchi, 2014) or struggle to learn in

traditional classroom settings (e.g. there are robots developed to help autistic students). Most robotics programmes are based on problem solving, are practical and encourage students to think, to be creative and increase their self-confidence (Mubin et al. 2013).

Over the past decade, several researchers and educators have used, in various contexts, educational robots as learning tools, in effective and constructive ways, to pass on particular knowledge or to support learning, highlighting **transversal skills**, such **as problem solving**, **decision making, adapting to change**, **critical thinking**, **computational thinking**, **creativity, collaboration**, **communication** and **teamwork ability**, essential skills to create a complete social, individual and professional profile (Khanlari & Kiaie, 2015, Socratous & Ioannou, 2019, 2020).

Robotics helps students improve skills which may be difficult to develop in a traditional classroom learning context, but are key scientific and engineering practices (Gura 2012). Asking questions, formulating and defining problems, planning and conducting research, and engaging in argument from evidence are some of the skills developed (Gorakhnath & Padmanabhan, 2017). Students with **special needs and abilities** develop their own personal learning experience and can have access to information and educational content, following a pathway that suits their interests, needs, preferences and learning styles.

In brief, educational robotics provides opportunities for:

- ✓ Development of transversal competences, essential skills both socially and professionally, and thinking skills through students' questioning, problem solving and designing solutions, that value in real life situations.

- ✓ Teamwork - students practice listening, communication and collaborative skills.
- ✓ Engaging students in programming-they learn to control a robot following precise instructions.
- ✓ Multisensory learning-learning is stimulated by naturally engaging students on multiple levels.
- ✓ Building skills, essential for students' future career. They not only learn how to develop and control technology and complex knowledge structures, but also how to practice basic skills required in the future workplace.

To sum up, educational robotics has been repeatedly proven to be a powerful teaching and learning tool that has tremendous potential to improve classroom teaching in Primary Schools as well (Khanlari & Kiaie, 2015), including supporting the education of students with disabilities, having a variety of learning styles, who may lack motivation or have lost interest in science or technology (Anwar et al, 2019).

Interestingly enough, echoing Alimisis (2013) it is worth mentioning that while educational robotics is popular with students of all ages, it finds scope mainly in informal educational environments and conditions (educational programs of organizations, festivals, competitions, etc.).

Educational Robotics in Primary School in Europe

Notwithstanding the lack of heightened interest in formal education, **r**obotics training programs are becoming increasingly popular in most developed countries and are spreading to the developing world. Robotics is used to teach

problem solving, programming, design, physics, maths, even music and art to students at all levels of their education.

Over the last decade robotics has attracted the high interest of teachers as a valuable tool for the development of cognitive and social skills for students from Preschool to High School and for the support of learning in science, mathematics, technology, computer science and other school subjects or interdisciplinary learning activities.

The literature delineates three different approaches to Educational Robotics in formal education (Eguchi, 2010), namely:

- *Curriculum approach based on topics*, whereby curriculum areas are integrated around a specific learning topic and are studied mainly through research and communication (e.g. Detsikas & Alimisis, 2011; Litinas& Alimisis, 2013).
- *Project-based approach,* whereby students working in groups explore real-world problems.
- *Targeted approach,* which involves children competing in challenges in robotics tournaments that take place mainly outside of school.

At the same time, actions and events are held in educational environments to support and promote educational robotics ranging from thematic workshops and regional conferences to regional or national tournaments and seminars for teachers etc.

Although there is no systematic introduction of robotics in school curricula in European school systems (Alimisis, 2013), a report states that at least 18 European countries have included it in their curricula (European Schoolnet,

2015). With its introduction, the respective states aim at improving computational and logical thinking, interest in technology and programming, and generally students' ICT skills in general. Coding and programming are mandatory, for example, in Bulgaria, the Czech Republic, Slovakia, Finland, Portugal and partly in the United Kingdom. Countries that combine coding and robotics in their education are, among others Slovakia, the Czech Republic, Spain, Estonia and Malta.

Regarding the involvement of coding-robotics and STEM in primary school curricula of the partner countries participating in Codeskills4robotics and in accordance with the comparative report of the program (Codeskills4Robotics, 2019) the following conclusions can be drawn:

In **Greece**, Educational Robotics is not an autonomous subject taught in public primary schools. Teachers, however, apply robotics training activities and incorporate them into their teaching based on their personal interest and knowledge regarding the subject. Nevertheless, reference is made to Robotics in the new curriculum for Computer Science in primary education, which is taught by a computer science teacher as a separate subject in all primary school classes for one (1) teaching hour per week. Learning objectives include "Modeling with concept diagrams" and "Computer programming". At the same time, the concepts of robotics are presented in the individual sections of the curriculum for the 5th and 6th grade. Recent modifications made by the Ministry of Education, Robotics and STEM / STEAM are included in the "Skills Laboratories" that will be piloted in the country from this academic year, 2020-2021 and are included in the thematic cycle "Create and Innovate" (Creative thinking and initiative-Build new ideas, give new solutions).

In **Sweden**, since autumn 2018 programming has been included in primary schools, especially in the field of mathematics and technology. In addition, although many teachers use educational robotics in their teaching, all indications point to the fact that their skills need reinforcement.

In **Cyprus**, primary school curricula do not consider ICT as a separate subject but as a tool that has the potential to improve teaching and learning. However, robotics has been introduced since 2009 and today is part of the "Design and Technology" in the official curriculum (2 periods per week in the 5th and 6th grade for elementary school), in the section "System and control technology", with the prospect of being enhanced in the near future. In All-Day Primary Schools ICT (and, in some cases, robotics) is taught as an extracurricular subject.

In **Belgium**, for the Flemish community, ICT is considered to provide opportunities in all subjects and fields of study at primary level. Therefore, ICT is not taught as a separate subject, but it is integrated into the school curriculum as one of the three interdisciplinary final objectives. In the French-speaking community of Belgium, technology education is regarded, in a relatively broad sense, as a course based on the idea of technology as a field that contributes to the overall training of young people, as do courses of general education. In the German-speaking community, the field of "Science and Technology" is included in the defined main objectives of the primary school curricula, which is directly related to STEM. In this context, technology courses aim to develop skills that will allow students to solve technical problems of everyday life, as well as to develop their creativity and enhance their interest in technology-oriented professions. However, only 30% of teachers in the French and German-speaking communities use digital devices in the classroom. Therefore, the use of educational robots in primary schools is far from widespread.

A variety of robotic construction tools created and developed since the 2000s with improved and friendlier designs (LEGO Mindstorms NXT, Arduino, Crickets and more) have prepared the ground for the popularity of robotics among students of all ages. The pioneering efforts at schools over the last decade have shown that children enthusiastically participate in robotic projects that achieve learning goals and / or develop new skills (π.χ. Detsikas & Alimisis, 2011; Litinas & Alimisis, 2013).

Moreover, a lot of research studies are being carried out in Europe and in the world on Educational Robotics in Primary Education, with emphasis on the connection of the four courses: Science, Technology, Engineering and Mathematics (STEM), and sometimes of Art (Art) (STEAM) (Stergiopoulou et al., 2017, Ruiz Vicenteet al., 2020) as well as in a wider context (Misirli et al., 2019).

Overall, what is noteworthy is that Educational Robotics in Primary School can prove to be an important tool for achieving the abovementioned goals, but also as a means to **boost students' motivation** to actively participate in learning.

Hence, in the light of the aforementioned need for developing **21st century skills** such as programming and computational thinking skills among others and the potential positive contribution of robotics towards this direction CODESKILLS4ROBOTICS **Tool Kit** aims at enabling teachers, schools, public and local authorities, stakeholders to exploit and sustain its products, which can be easily used after the completion of the project. The Tool kit is to be offered both on hard copy (Learning Modules) and online (e-learning platform), thus meeting the diversity of teachers in EU countries in terms of being digitally developed or not.

3. Project Description

As previously mentioned, programming and computational thinking skills are becoming ever more important in our society and working life, since, in addition to others, learning to code also develops skills such as problem solving, logical reasoning and creativity. Nowadays, a growing number of countries in Europe and internationally are **refocusing** their **ICT curricula** on developing students' computer programming and coding skills, introducing the topic in national, regional or school curricula. Hence, schools are key players in introducing programming to students in an engaging way.

In the above context the CODESKILLS4ROBOTICS project comes to address the recommendation of the recent EC Report titled "New priorities for EU cooperation ET 2020" Report (COM 2015- 408), which stresses that "knowing how to code is empowering. It allows us to understand the digital world we live in and to shape it. Basic coding skills are essential for accessing the jobs of tomorrow and today" and for achieving a better skills-match between education and the world of work. "Coding is seen as the red thread that runs through future professions".

Within this framework, CODESKILLS4ROBOTICS project seeks to facilitate the development of programming and computational thinking skills among primary school students by producing a comprehensive set of tools designed for teachers, parents and policy-makers. Students will be introduced to coding through robotics, a channel which effectively initiates them to various STEM disciplines, while promoting transversal employability skills such as problem solving, leadership and creativity.

The direct target group of the project is **primary school children aged 9-12 years old** with emphasis on **children** with **fewer opportunities (+ girls)** who will learn how to code. The indirect target group is **school teachers** whose profiles will be upgraded and strengthened through the professional development program to acquire the essential digital and coding skills to be gradually involved in the implementation of the program as trainers.

More specifically, the CODESKILLS4ROBOTICS project pioneers to design an innovative program which aims to introduce **'**coding and robotics' to **primary school students (9-12)** by:

- Supporting schools to design their own **DIGITALSKILLS@SCHOOL Strategy/Action Plan** in order to implement the CODESKILLS4ROBOTICS program.

- Utilizing the extra-curricular time available in a constructive way to **set up** CODESKILLS4ROBOTICS **Clubs** in schools / educational institutions for students who voluntarily want to learn how to code, as purported by the COM (2015) 408 ET2020 report.

- **Creating Synergies** between the school and various stakeholders such as ICT professionals, providers, NGOs, enterprises etc. based on the principle of Volunteers Mentors who will support and guide throughout the process the primary school (teaching staff) to set up and run a CODESKILLS4ROBOTICS Club.

- **Introducing** the **Open Badges** as a method to validate and award the coding skills and competences acquired by both the teachers and the students.

4. Project Results

In each Intellectual Output, the consortium has strived to produce materials of the highest quality and usefulness, aiming to attract as many participants from all target groups as possible.

IO1: BUILDING THE CODESKILLS4ROBOTICS COMPETENCE FRAMEWORK: FROM THEORY TO PRACTICE

The **IO1** presents a comparative report for the current practice in Greece, Cyprus, Belgium and Sweden in relation to the teaching of digital, coding and robotic skills in primary education. The Report takes into consideration the EU Recommendations as well as the needs of primary school teachers and students, which have been recorded and analyzed from a dedicated survey, conducted in the first three months of 2019. It also includes a comparison of the existing teachers' training programs in Coding-Robotics and STEM skills. Finally, the competence framework is presented based on the digital skills needed through the analysis of the report.

http://codeskills4robotics.eu/io1-competence-framework/

IO2: CODESKILLS4ROBOTICS DUAL EDUCATIONAL BACK PACK FOR PRIMARY SCHOOLS (RESOURCES, TOOLS, TEACHING AND LEARNING MATERIAL FOR TEACHERS AND STUDENTS)

Based on IO1 (CODESKILLS4ROBOTICS Competences), **IO2** develops the DUAL EDUCATIONAL PACK, which includes the Teaching and Learning material with all the accompanying creative, interactive and motivational learning modules. Specifically, **the Educational Pack** contains:

- CS4R DATA BANK with a wide selection of tools, resources, teaching material, videos, reports, etc. highly useful for the implementation of the DIGITALSKILLS@SCHOOLS Clubs
- Teaching Packs for the Coding/STEM skills (e.g. teaching guides, online learning modules, educational/informative videos etc. for teaching Coding/Robotics to students) including four (4) cross-curricular scenarios for Robotics related to specific subjects of the NC

- Teachers Professional Development Course for the acquisition of Digital Skills
- Parents upskilling course for raising awareness and skills acquisition
- Campaign for the promotion of the DIGITALSKILLS@SCHOOLS Clubs with YouTube videos, Social Media spots and posts etc.

http://codeskills4robotics.eu/io2-educational-back-pack

IO3: THE ECO-SYSTEM OF THE CODESKILLS4ROBOTICS ASSESSMENT AND VALIDATION METHODOLOGY THROUGH THE OPEN BADGES

Based on IO1 (CODESKILLS4ROBOTICS Competence Framework) and the IO2 (CODESKILLS4ROBOTICS Educational Pack), **IO3** develops the Open Badges system for the validation of the skills to be acquired by primary school students as well as the structure and description for issuers: primary school teachers.

The Open Badges (OB) system aims to introduce Quality standards for Coding and Robotics skills in primary schools, both in relation to the strengthening of Teachers profiles and in relation to the introduction of evidence-based data for Quality Assurance. Acquiring Open Badges is a motivating procedure, which provides incentives for primary school students to continue their training. It is linked to digital skills, as Open Badges are created on-line through the use of an open-platform and can be shown on various personal pages. In addition, at a later step, primary school students can use this method in their own work environment to motivate their colleagues/employees/volunteers.

The IO3 report refers to:

- The theoretical background of the methodology used
- The link of Open Badges levels with the benchmarks and indicators of the Competence Framework designed in IO1, which need to be achieved in order for a student to receive an Open Badge.
- The structure (levels, hierarchy connections between single badges or group of badges)
- The task/test/challenge that needs to be accomplished to be awarded with each Open Badge and make the necessary links in relation to the assessment process and the tool to be used.
- The graphic designs of badge system

- The possible ways that OB can be endorsed by external organizations and stakeholders- synergies

http://codeskills4robotics.eu/io3-assessment-open-badges/

IO4: THE CODESKILLS4ROBOTICS INTERACTIVE PORTAL AND MOBILE APP: LEARNING, TEACHING AND ASSESSMENT IN THE DIGITAL ERA

IO4 focuses on the design and development of a dynamic and interactive e-learning and e-assessment platform (Interactive Portal) and Mobile app, which hosts all the educational material on Coding, Robotics and STEM Skills, which was developed as part of IO2 as well as the Open Badges eco-system designed as part of IO3.

The **e-platform** hosts the **dual educational pack** together with the **e-Resources data bank** with extra useful tools and resources to supplement the official educational backpack. The material is divided into two categories. One for the teachers with extra tips and solutions to exercises and one of the students, which is a subset of the material for teachers. The educational material is presented in the form of **e-courses and e-books**, using as many multimedia elements as possible (images, videos, files, pages, links to external content, etc.) in order to make it more appealing and user-friendly to the reader. A table of contents on the right-hand side of each page eases the navigation of the readers.

Each **e-course** also provides communication capabilities through dedicated chat rooms for real-time communication and forums for non-real time communication between the participants (teachers and students) creating thus an **e-Community** for mentoring, peer and expert support, guidance and exchange of good practices.

Finally, the **e-platform** hosts the **open badges eco-system**, which gives the chance to teachers to issue and award the **7 developed open badges** to the students who fulfil the preset criteria as an incentive and also as a recognition and validation of the newly acquired skills. An extra badge, the **mentor badge** was also designed, which was addressed to those teachers who successfully completed the C1 training activity.

The **e-learning** and **e-assessment platform** can be accessed at:

http://codeskills4robotics.iit.demokritos.gr/

and is provided in all three (3) languages of the consortium, namely, English, Greek and Swedish together with the offered educational material.

Potential students are first required to create their own account (sign up), build their digital profile and then once they login (sign-in) they can simply self-enroll in the offered e-courses and access the educational material and the exercises.

Finally, the e-platform is accompanied by a **Mobile App**, which offers the same functionalities, as its web app and can be downloaded here:

https://play.google.com/store/apps/details?id=gr.demokritos.iit.codeskills4robotics

http://codeskills4robotics.eu/io4-interactive-portal-mobile-app/

The four aforementioned Intellectual Outputs (IO1-IO4) form the core content basis of the **IO5**, which is to be analytically presented in the following sections.

5. IO5: The Tool Kit for the Setting Up of the DigitalSkills@Schools Clubs as Part of the Digital Action Plan-The CODESKILLS4ROBOTICS in Schools.

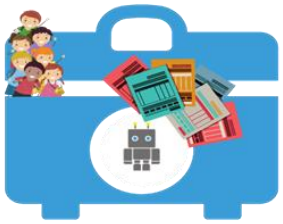
IO5 focuses **on the production and pilot testing of the TOOL KIT,** which is essential for each organization for the implementation of the CODESKILLS4ROBOTICS Program in primary schools, training, education centers and other education Institutions based on the creation of **DIGITALSKILLS CLUBS**. More specifically,

The main aims of IO5 are:

- ✓ to **design, develop, produce and pilot-test** the **TOOL KIT** necessary for the implementation of the 'CODESKILLS4ROBOTICS PROGRAMME' for skills acquisition
- ✓ to implement the **CAMPAIGN** and a **PETITION** in support of introducing this type of skills to students
- ✓ to promote the **creation of SYNERGIES** with teachers, trainers, business and ICT experts, professionals, banks, enterprises, SMEs etc. needed for the sustainability and exploitation of the project.

The first part of IO5 involves the process of the **TOOL KIT** development and its accompanying material, which is portrayed in the following section.

5.1. Design and Development of the TOOL KIT



The **TOOL KIT** includes the products developed on the basis of the intellectual outputs **IO1, IO2, IO3**, and **IO4**, namely, the CODESKILLS4ROBOTICS **Competence Framework**, the CODESKILLS4ROBOTICS **Educational Pack, the Open Badges system** and the CODESKILLS4ROBOTICS **Interactive portal and Mob. App**, providing at the same time a road map and guidelines, as well as practical tips along with monitoring and evaluation tools for the implementation of the CODESKILLS4ROBOTICS Program.

More specifically, the **TOOL KIT** contains a roadmap (Annex C), useful and practical information and ideas for application, taking into consideration the different needs of the several educational environments where CODESKLLS4ROBOTICS program could be implemented as a key agent for their digitalization. It aims to offer concrete and practical help to schools, clubs or any other type of educational institutions or children-related organizations and associations that would decide to implement it with their young members. Overall, the **Tool Kit** will enable partners and other organizations to have a step-guide which will ensure high quality provision and monitoring of the learning provision. For this purpose, it provides:

- **Guidelines** and practical tips for the i**mplementation**, **monitoring** and **evaluation** of the CODESKILLS4ROBOTICS program (5.1 a)
- A detailed schedule for **setting up synergies** and **voluntary actions** to be taken along with the implementation (5.1.b)
- A complete communication plan for a **Campaign** and **Petition** (5.1.c)
- **Good examples** and **practices** from similar projects (5.1.d)

5.1.a. Guidelines for the Implementation, Monitoring and Evaluation of the CODESKILLS4ROBOTICS Program

The proposed guidelines on how to **implement, monitor and evaluate** the Tool Kit are presented in the following sections, commencing with the recommendations tailored to the forms the implementation can adopt.

In particular, the implementation of the CODESKILLS4ROBOTICS Program can take various forms, depending on specific organizational aspects and contextual needs of each school/educational institution in each country. The role of the teacher-mentors and the CODESKILLS4ROBOTICS experts can be said to be instrumental in the implementation process. The recommended implementation forms mainly pertaining to two major categories, namely **Within School Time** and **After School Time/Summer School/Other** are presented in detail in the following figures:

Figure 1. Recommended Forms for Tool Kit implementation

Within School time

The implementation of the CODESKILLS4ROBOTICS **Tool Kit within the school Curriculum** offers the school units the chance to make a step further towards the direction of developing both teachers' and students' digital skills, while having at their disposal an important tool for enhancing their digital strategy. The integration of the CODESKILLS4ROBOTICS Programme in the school Curriculum brings forward educational robotics as a **means to achieve the learning goals and objectives** that are associated with the various subjects that the class teacher chooses or is assigned to teach.

How does the CODESKILLS4ROBOTICS Tool Kit support the teacher in the educational process and its practical implementation? In short, by:

- Offering the necessary theoretical preparation to the class teacher.
- Offering provision for the teacher's support by CODESKILLS4ROBOTICS mentors-experts either through face-to face training events or webinars.
- Providing rich digital material on the e-platform and its mob. App.
- Suggesting readily available teaching material to be used in class.

- Encouraging and guiding teachers to develop their own lesson plans tailored to the needs of the specific students.
- Promoting school and inter-school co-operations.

Hence, the utilization of the **educational tools** and the aforementioned **pedagogic support** that the CODESKILLS4ROBOTICS Tool Kit offers can be combined in practice in the following cases:

- Supporting the teaching of the **school subjects** in class, especially STEM subjects;
- **Cross-Curricular Approaches** of Flexible Zone or other Innovative Programs;
- **Skills Training Workshops** that are offered or will be offered in many European countries;
- Teaching **Specialty Subjects**, like ICT subjects;
- The **activities** students are engaged within the framework of the educational clubs or groups taking place usually during **all-day School** or **Extended School Program**;

In parallel, the implementation of CODESKILLS4ROBOTICS Tool Kit crosses the classroom barriers, becoming a matter of interest for the whole school community. Within this framework, a wide range of **educational initiatives** can take place, aiming at familiarizing both the school teachers and the students with Educational Robotics:

- ✓ Teacher-mentors and CODESKILLS4ROBOTICS experts can organize **an hour workshop** within the school curriculum**/extra- curricular activity** on a weekly basis for students to become familiar with coding and programming skills by applying the CODESKILLS4ROBOTICS **Tool kit.**
- ✓ Teacher-mentors and CODESKILLS4ROBOTICS experts in collaboration with educational coordinators can organise various **workshops –**

internal training for other school teachers to become familiar with coding and programming skills by means of the CODESKILLS4ROBOTICS **Tool Kit**.

- ✓ **A school exhibition** can be organized by the teacher-mentors participating in the Codeskills4robotics pilot implementation, whereby their students take on the initiative to present to other classes the activities they were engaged in. Additionally, the material produced by CODESKILLS4ROBOTICS such as educational guides, texts, brochures, students' projects etc. can be part of the exhibits.

- ✓ **An open invitation** can be sent to other classes of the primary school to attend in real time the activities taking place during the actual pilot implementation of the CODESKILLS4ROBOTICS **Tool Kit**.

- ✓ During the **activity time zone of All-day school** under the guidance of the teacher-mentor the students who participated in the pilot implementation of CODESKILLS4ROBOTICS can make a **presentation** of their activities to other students encouraging them to experiment themselves as well.

- ✓ The DigitalSkills@School Club of the school can organise **info days/open days** for the EU Code Week and EU Robotics Week to promote coding skills and digital competences for primary school teachers.

- ✓ **A Participation** to an Erasmus+ or eTwinning project on Educational Robotics.

Figure 2. Recommended Forms for Tool Kit implementation

After School Time/Summer School/Other

The CODESKILLS4ROBOTICS Tool Kit can also find a field of application **outside the official school Curriculum** as well**.**

The establishment of *afternoon groups* during the school year but during *summer schools* as well offers the chance to inter-school groups, parents' Associations, self-governing bodies, cultural and other educational institutions to propose various activities, whereby educational robotics is not the means but the **ultimate purpose** of the educational process.

The general goal is the engagement with robot construction and coding through play and the enhancement of the digital profile of the school units/educational centers through promotion and dissemination actions and events (Robotics days- exhibitions etc.). In this case, CODESKILLS4ROBOTICS Tool Kit can fully support the various applications, as its educational tools offer a wide range of choices. In particular:

- The introductory part of the **Educational Backpack** supports in simple steps the basic principles for robot construction and for Coding and Programming them.
- Emphasis is given on the small Constructions of the Educational Backpack.
- Activities are suggested in the form of small exercises and tasks to be completed.
- The proposed Constructions can support the design of bigger projects, when combined with the initiatives and the activation of the participants' creativity and fantasy.
- The **alignment** to a wider **common purpose** is sought (Participation in Robotics Competition).

Within this framework, the following activities can be held**:**

- ✓ A primary school teacher-mentor or a CODESKILLS4ROBOTICS expert can organize **workshops** for introducing students to coding skills by employing the CODESKILLS4ROBOTICS **Tool Kit**.

- ✓ After school hours the **DigitalSkills@School Club** with the help of teacher-mentors and CODESKILL4ROBOTICS experts can organise **workshops and open info days** to introduce parents' association and local authorities to the CODESKILLS4ROBOTICS program.

- ✓ After school hours the **DigitalSkills@School Club** with the support of the teacher-mentors and CODESKILL4ROBOTICS experts can organise **webinars** to familiarise teachers interested in implementing CODESKILLS4ROBOTICS **Tool Kit** with their students.

- ✓ After school hours an ambassador teacher can create a **social media campaign** to promote CODESKILLS4ROBOTICS piloting results and invite other teachers, parents and organisations, schools to sign the **Memorandum of Digital Commitment** and become CODESKILLS4ROBOTICS **Ambassadors.**

- ✓ After school hours an **ICT Centre/Children's education centre** can implement the CODESKILLS4ROBOTICS Program, as part of its curriculum activities offered to its students.

- ✓ After school hours an ICT Centre/Children's education **centre** can implement the CODESKILLS4ROBOTICS Program as a means to support competition participation.

- ✓ **A Children's Summer Camp** or **an educational Centre** can implement CODESKILLS4ROBOTICS Program with their students, as part of the summer activities programme.

As illustrated in the above tables, the flexible nature of the Program allows for its implementation both in **formal educational settings** and in **informal ones**, as part of the **school curriculum** (in class or cross-curricular), as an **after school extra-curricular or team-building activity**, **or teacher training event.** More importantly, it can be implemented in VET Education as well, having been tailored to the needs of the teenage student population.

Besides the guidelines regarding the proposed sets of forms that CODESKILLS4ROBOTICS implementation can adopt, there is provision for all the **documents** and **templates** necessary both for the **implementation and monitoring** from the time of registration of students to the time of completion of the program, which are readily available in **Annex A** for those interested to implement the programme.

What are the templates needed to implement and monitor the CODESKILLS4ROBOTICS Tool Kit in your school/education centre?

- ✓ Invitation letter to schools
- ✓ Invitation letter to catering companies (Optional)
- ✓ Letter of appreciation to visiting companies (Optional)
- ✓ Student Registration Form
- ✓ Parental consent for Participation Form
- ✓ Parental Consent for taking Photos Form
- ✓ Teacher Consent for Taking Photos Form
- ✓ Participation List
- ✓ Weekly Schedule
- ✓ Project Activities Report

The registration and consent forms are to be filled in prior to commencing the implementation, while the last three templates are to be updated throughout the implementation process, serving monitoring purposes. Parental Consent is necessary for the implementation of the programme in schools and not for private education centres.

In addition to the above templates, **the evaluation tools** expedient for the **assessment and evaluation** of the programme implementation along with a supplementary **Evaluation Guide** to facilitate the input analysis are provided, as integral part of IO5 Annex B.

What are the templates needed to evaluate the CODESKILLS4ROBOTICS Tool Kit implementation in your school?

- ✓ Student Evaluation Form
- ✓ Teacher Evaluation Form I
- ✓ Teacher Evaluation Form II (Tool Kit Pilot)
- ✓ Teacher Testimonial Template
- ✓ Student Testimonial Template
- ✓ Teacher and Student Testimonial Guide and Templates
- ✓ Evaluation Guide

The evaluation tools are quantitative ones with some embedded qualitative questions and are addressed both to teachers and students for reasons of triangulation. In particular, the student quantitative questionnaire consists of 12 statements of agreement on 1-5 Likert scale, offering also the opportunity for qualitative feedback by means of an open-ended question. Teachers Evaluation Form II is a quantitative questionnaire with 13 open-ended questions in order for the qualitative input to allow to delve deeper into their perceptions. The evaluation questionnaires are to be filled in by the participants after the completion of the implementation.

Besides the aforementioned forms, the overall evaluation can be supplemented by the input of teacher testimonials and student testimonials, sharing their experiences after they have completed the program. It is suggested that the evaluation process be carried out on the basis of the evaluation criteria set, in accordance with the evaluation guide framework designed, containing the corresponding evaluation form items and measuring certain parameters, being part of IO5 Annex B.

Following the provision of detailed guidelines for the implementation and evaluation of the CODESKILLS4ROBOTICS Programme by potentially interested educational institutions, the next sections focus on the proposal of an analytic scheme on the creation of synergies and campaign development plan to enhance the implementation process.

5.1.b. Setting up Synergies and Voluntary Support Groups - Towards the DigitalSkills@Schools Synergies

Implementing the CODESKILLS4ROBOTICS program is an effective and impactful way to foster the development of young peoples' computational thinking skills in a creative way. Its impact on the students and on the implementing institution, however, can be further increased by setting up synergies with relevant stakeholders.

The flexible nature of the CODESKILLS4ROBOTICS program makes it so that the initiative can be implemented in different learning settings, including:

- As part of the school curriculum (within a specific class, e.g. ICT, or as a cross-curricular activity bringing together, e.g. mathematics and art);
- As an after-school or extracurricular activity;
- As a summer school for students;
- As a training opportunity for teachers;
- As a team-building activity;

Depending on the learning context, the implementation of the program will require at a minimum the participation of a teacher/trainer and of a group of learners. Besides this core group, the learning experience can be enriched by the participation of a variety of stakeholders:

- **Experts and role models**, including ICT and robotics experts, professors, LEGO Ambassadors, media personalities in the STEM field (TV or radio personalities, journalists, YouTubers);
- **Local authorities**, who can introduce the activity and make a link with local education policies;
- **Company representatives**, who can make a link with the job market and offer students a vision of what working in a related sector can look like;
- **Parents**, who can take part in the activity and learn alongside their sons and daughters or be trained in advance and take on the role of teachers;
- **Volunteers** (especially student volunteers), who can assist the teachers in implementing the programme while developing their own computational thinking skills as well as other transferable skills;
- **Students' siblings and/or friends**, who in the context of an open-day can be the audience of what the students have learned and created.

All of the above can be invited to formalise their support for the CODESKILLS4ROBOTICS project by becoming **Ambassadors**. The agreement can be of a formal or informal nature but it should highlight the benefit that the collaboration is bound to bring to both parts.

Synergies can also be beneficial for the institution implementing the CODESKILLS4ROBOTICS project. In order to keep the initiative up and running, the institution might benefit from seeking support from:

- **ICT/robotics companies**, which can simplify the acquisition of the necessary technical material and favour the establishment of long-term cooperation;
- **Other schools** implementing the CODESKILLS4ROBOTICS or similar programmes, in order to exchange best practices and organise robotics competitions;
- **European networks and initiatives**, such as EU Code Week (more details in the following section of the Toolkit), eTwinning, School Education Gateway, European School net and others;
- **Volunteers**, who contribute the energies and enthusiasm needed to keep initiatives running.

In order to formalise their support for the initiative, schools, companies and organisation can be invited to sign a **Memorandum of Digital Commitment** and become Ambassadors. The procedure and implications of becoming a CODESKILLS4ROBOTICS Ambassador are fully described on the project website: for schools and for organisations.

The stakeholders identified in the previous paragraphs can be reached through different channels, depending on national specificities and on the existing relationship between the stakeholder and the institution implementing the CODESKILLS4ROBOTICS (if any). In general terms, the following channels have proven to be successful in reaching specific stakeholders:

	Primary ways of contacting
A) **Educators** of all kind of public	Partners educational activities (staff, courses) Focus groups Conferences and events Newsletters E-mail Project website / Online Platform Social media posts and groups Online postings Press releases
B) **Adult citizens** of all ages and background	+ Focus groups Publications and journal articles Conferences and events Newsletters E-mail Project website / Online Platform Social media posts and groups Online postings - Press releases
C) **Experts on digital issues and organizations** that are active in the field of internet security, online misuses cybercrime	+ Focus groups Publications and journal articles Conferences and events Newsletters E-mail Project website / Online Platform Social media posts and groups Online postings - Press releases

D) **Other educational stakeholders** (schools, VET and training centres, companies active in education sector, researchers and academics)	+ Publications and journal articles Conferences and events Workshops Newsletters Email Project Website / Online Platform Social media posts and groups - Online postings
E) **Public authorities, decision-makers and civil servants** concerned by digital, privacy, and other relevant issues	+ Focus groups Press releases Newsletters E-mails Short face-to-face presentations and events - Project website / Online Platform
F) **European institutions and other European/ international organizations**	+ Press releases Newsletters E-mails Short face-to-face presentations and events - Project website / Online Platform
G) **Civil Society organisations not in education sector**, in particular in field related to digital issues	+ E-mail Newsletters Project website / Online Platform Social media posts and groups Online postings Workshops or presentations face-to-face Conferences and events Publications and journal articles - Press releases

5.1.c. Campaign and Petition

Objectives

Why

The primary objective of this campaign is to promote the CODESKILLS4ROBOTICS Programme and particularly the implementation of **CODESKILLS@SCHOOL Clubs**. As a secondary objective, the campaign will also help raise awareness about educational robotics and ensure the visibility, sustainability and exploitation of project results.

What are the **top 3 objectives** you plan to achieve with your **local campaign**?

Based on how you are going to implement the CODESKILLS@SCHOOL Clubs, think about what you want your campaign to accomplish **in general terms**: who do you want to reach out to and what do you want to obtain from them?

- ✓ [e.g. reach out to school leaders to promote the initiative and explore whether some of them would be interested in implementing the Clubs]
- ✓ [e.g. get students on board in order to create a core of Ambassadors to promote the Clubs]
- ✓ …

Target groups

Who

The target groups of this campaign correspond to the project general target groups. The campaign, however, should target **primarily** those groups which will be hypothetically responsible for the implementation of the CODESKILLS@SCHOOL Clubs. This includes:

- School leaders

- Teachers
- Local authorities
- Other relevant stakeholders relevant to each partner's national context]

Secondary target groups include those who might support the implementation of the Clubs, particularly:

- Students (ages 9-12, with a focus on students with fewer opportunities and girls)
- Parents
- ICT experts
- Companies
- [Other stakeholders relevant to each partner's national context]

General awareness raising efforts can be directed to the school community, students' families and networks and the general public.

Based on the target groups listed above, **who do you plan to reach out to concretely** with your campaign?

Based on how you are going to implement the CODESKILLS@SCHOOL Clubs and on the objectives, you identified earlier, what specific groups are you going to reach out to with your campaign? **Be specific**.

- ✓ [e.g. the director of XY School with whom we have an active collaboration since 2015]
- ✓ [e.g. the teachers in Z School's Facebook group]
- ✓ [e.g. the students who took part in last year's coding summer school and their parents]
- ✓ [e.g. the company from which we bought a set of educational robots two years ago]
- ✓ …

Toolkit

How

This section includes a list of communication resources that might be useful when planning and implementing a promotional campaign.

Face-to-face communication is generally recommended over social media and other online actions when trying to establish a collaboration for the implementation of the CODESKILLS4ROBOTICS Clubs. Online promotion can be used to generate interest in the Clubs among students and their families, recruit participants, as well as to raise awareness about the project in general terms.

- Visual material
    - **Roll-up**
    - **Flyer 1** (project presentation)
    - **PPT presentation template**
    - **Badge for students** (a circular badge to be handed out to students who take part in the Clubs; it can be printed on regular paper, sticker paper or made into button badges)

- **Social media**
    - Sample Facebook/LinkedIn posts that can be posted on your page:

Launch of the Clubs:

CODESKILLS4ROBOTICS Programme:

Staff training:

- **Hashtags** you can use in your posts: #CODESKILLS4ROBOTICS #robotics #coding
- **Countdown illustrations** (4 illustrations for social media counting down 4 weeks to the launch of the CODESKILLS4ROBOTICS Clubs)
- **Posting guidelines**:
  - Use emojis☺ Our target group is on the younger side and it is proven that colorful posts receive more engagements (i.e. clicks, likes, comments, shares)
  - Include media (pictures, videos, gifs): it is more eye-catching than plain text and it invites more engagements

- Use hashtags (#CODESKILLS4ROBOTICS #robotics #coding)
- Keep it short: if you wouldn't read it when scrolling through your Facebook because it's too long, nor will your target group
- Include links to CODESKILLS4ROBOTICS website to promote visits

- **Memorandum of Digital Commitment**: available on CODESKILLS4ROBOTICS website in two versions: for schools and for organizations.

- **EU Code Week resources**: the EU Code Week is a yearly campaign which aims to bring basic programming skills and digital literacy to everybody in a fun and engaging way. The initiative is decentralized across the EU (and beyond, to a smaller extent) and gathers thousands of events that promote coding under a single label, giving them visibility and cohesion.

  The EU Code Week is an **ideal time** to launch an initiative such as the CODESKILLS@SCHOOL Clubs or generally to promote coding-related events and projects.

  How to take part in the EU Code Week and gain visibility?

  - Organise an activity or event and pin it on the map;
  - Use the official EU Code Week visual resources to promote the initiative;
  - Explore other initiatives happening in your country to identify other stakeholders and potentially create synergies;
  - Network with other initiatives to gain a Certificate of Excellence;
  - Post frequently on social media, using the hashtag #CodeWeek and tagging @CodeWeekEU;
  - Contact your national Ambassadors promote CODESKILLS4ROBOTICS and for more information on the EU Code Week.
- **Identify potential Ambassadors**: having official project supporters who are willing to spread the word is an excellent, sustainable dissemination opportunity. Anyone can be an Ambassador, but the wider their network

and the closer their involvement in the digital education scene, the wider the impact to be expected.

What do you expect from your Ambassadors?

Before contacting someone to ask them to become an Ambassador, think carefully about what you are asking them to get involved in. Ambassadors are expected to **register on the e-platform** (to be developed as part of IO4) and **promote the project results**. Teachers and students will be among the first ones to be involved (at least 300 of them), but other powerful Ambassadors might include:

- IT experts
- Digital education advocates
- Company representatives
- Members of NGOs working on digital education
- …

Based on how you are going to implement the CODESKILLS@SCHOOL Clubs, on your network of contacts and on your national specificities, **what are you going to expect from your Ambassadors**? Which target groups are you going to involve as Ambassadors? Are you going to set different requirements for Ambassadors belonging to different target groups? **Be specific** (and realistic).

- ✓ [e.g. Teacher Ambassadors will be expected to attend an informative session about the project in order to be able to present it to other stakeholders]
- ✓ [e.g. Companies will be expected to sign the Memorandum of Digital Commitment]
- ✓ [e.g. Student Ambassadors will invite at least 10 friends to join the Clubs]
- ✓ […]

Here is a sample email to contact potential Ambassadors (to be adapted according to target group and national specificities).

Dear [potential Ambassador],

Are you interested in coding and robotics? Do you think it's important for children to learn how to code? Would you like to give them more opportunities to do so in school?

The CODESKILLS4ROBOTICS project is interested in you! We are looking for [companies / schools / teachers / students / …] to become part of our project and help us promote educational robotics in schools.

What does it mean to become a CODESKILLS4ROBOTICS Ambassador?

[Your requirements]

If you're interested in becoming one of us, [how to get in contact with you or how to apply to become an Ambassador]

"Everybody in this country should learn how to programme a computer because it teaches you how to think", Steve Jobs once said. Let's make this a reality together.

Best regards,

[…]

Alternatively (or in addition to one-to-one contact), the recruitment of Ambassadors might take place through an **open call**; this should be particularly efficient when recruiting students or teachers.

Outcomes and timeline

When

Based on the general objectives identified earlier and, on the tools, presented above, a detailed outline of the campaign can be developed using the table below (partially filled in as an example):

Actions	Targetgroup	Tools	Expectedoutcome
Objective 1: [EXAMPLE] reach out to school leaders to promote the initiative and explore whether some of them would be interested in implementing the Clubs			
Action 1.1: [EXAMPLE] send preliminary email to 20 selected school leaders from personal database to inform them about the project and the possibility to implement CODESKILLS@SCHOOL Clubs	[EXAMPLE] School leaders from the X region, in particular: • Mr. X • Ms. Y • Ms. Z	• [EXAMPLE] PPT presentation of the project in attachment	[EXAMPLE] Establish a dialogue with **10** schools with the objetive to involve at least **3** of them in the implementation of the Clubs
Action 1.2: [EXAMPLE] reach out to teachers to present the project and the Clubs asking for their support for implementation	[EXAMPLE] Teachers in the Facebook group "Association XY for digital education"	• [EXAMPLE] 4 posts, 1/week, presenting the project results	[EXAMPLE] At least **50** engagements and establishing a personal contact with at least **5** teachers
Action 1.n: ...	...	...	...
Objective 2:			
Action 2.1			
Action 2.2			
Action 2.n			
Objective 3:			
Action 3.1			
Action 3.2			
Action 3.n			

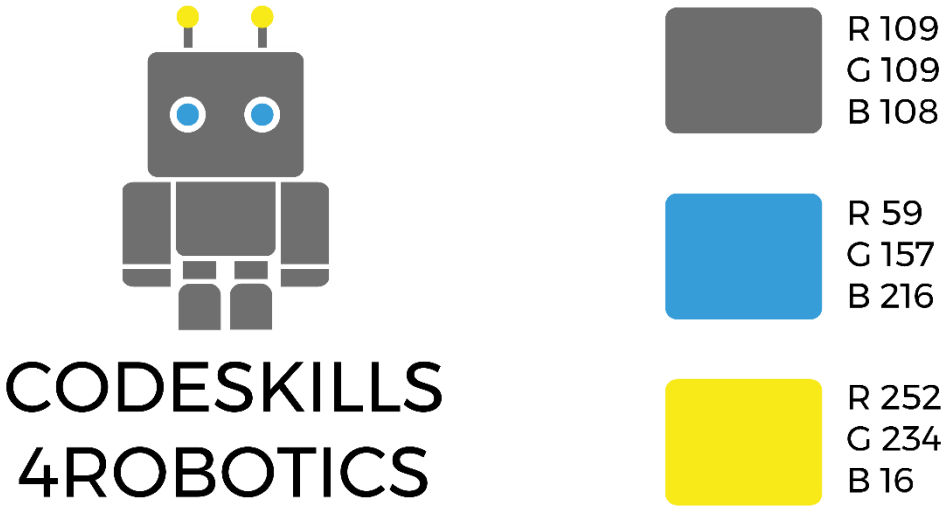
2020	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28
Actions	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Action 1.1												
Action 1.2												
Action 1.n												
Action 2.1												
Action 2.2												
Action 2.n												
Action 3.1												
Action 3.2												
Action 3.n												

Useful tools

Here is a list of communications tools you might find useful in your campaign:

- Mailchimp: creating and sending newsletters; creating landing pages for events; managing contact databases
- Canva: simple, free, user-friendly graphic design software
- Unsplash, Pixabay: royalty-free images
- Coolors: colour schemes generator (here is CODESKILLS4ROBOTICS palette on Coolors)
- Flaticon: free vector icons
- Freepik: free vectors, stock photos, PSD and icons

/!\ Always refer to the **project visual identity** before creating new material!



5.1.d. Good Examples and Practices from Similar Programs which can Offer Support During the Preparation Stage of the Program, Avoid Pitfalls etc.

The following organizations and actions related to Robotics and coding can provide a valuable insight into the field of educational robotics and act as a source of information and good practices to be employed where considered expedient.

The ***WRO Educational Robotics Olympiad*** is one of the most popular international competitions, through which those teams that represent their country at the World Robot Olympiad stand out every year. The topics of the competition are translated and announced in participating countries in March every year, while the National Final of the WRO Educational Robotics Olympiad is held every July. The winning teams advance to the World Robot Olympiad, which is hosted each year by a different country, usually in autumn.

TFLL or ***FIRST LEGO LEAGUE*** is a worldwide robotics organization, in the form of tournament, for kids aged 9 to 16 years old. It is designed to help kids discover and love science and technology in the most fun way by trusting their abilities and believing in themselves, while teaching them valuable life skills. It is a collaboration of the FIRST® (For Inspiration and Recognition of Science and Technology) and LEGO® education sector and has been organized annually since 1998 in more than 98 countries worldwide.

The ***Raspberry Pi Foundation*** is a UK-based charity that works to put the power of computing and digital making into the hands of people all over the world. Through the open projects, more people are able to harness the power of computing and digital technologies for work, to solve problems that matter to them, and to express themselves creatively. The open projects include coding, robotics and STEAM courses, while the platform of Raspberry Pi supports the founding of coding clubs.

CoderDojo is a global movement of free, open, volunteer-led coding clubs (Dojos) where young people aged 7–17 (Ninjas) can explore digital technology with the support of their fellow Ninjas and volunteer mentors. Most projects and lessons that are used in Dojos around the world include coding and robotics courses.

ESA's Education Office is responsible for the ESA corporate education program bringing together young people from many different nations. The aim is to help young Europeans, aged from 6 to 28, to gain and maintain an interest in science and technology, with the long-term objectives of contributing towards the

creation of a knowledge-based society and ensuring the existence of a qualified workforce for the Agency that will ensure Europe's continued leadership in space activities. The school STEAM projects for young ages, in a form of contest, are Astro Pi, Can Sat, Climate Detectives, Moon Camp Challenge and Mission X.

Moonhack is a free international event bringing together kids from across the world for a week of coding, hosted by the Telstra Foundation in Australia. Kids are invited to develop coding / robotics planet-saving solutions. Participants can also get free access to the Coding Club Australia courses.

Code.org® is a nonprofit dedicated to expanding access to coding and computer science in schools and increasing participation by young women and students from other underrepresented groups. Code.org is famous for the annual Hour of Code campaign, which has engaged more than 15% of all students in the world. Code.org is supported by the giants of Computer Science including Microsoft, Facebook, Amazon, the Infosys Foundation, Google and many more.

Following the **design** and the **development** of the TOOL KIT previously addressed, IO5 provides the opportunity to **pilot test** the TOOL KIT designed and the STRATEGY that each partner organization has decided to develop for its school, implement the project outputs and utilize the resources developed, revise them before they are openly provided to be used at the National and EU, as analytically discussed in the next section.

5.2. DigitalSkills@School Clubs as Part of the Digital School Strategy Implementation and Evaluation of The CODESKILLS4ROBOTICS Programme

The CODESKILLS4ROBOTICS program addresses the integration of Coding and Robotics skills in primary schools for students and teachers. In essence, the project offers through the implementation **upskilling opportunities to teachers (in-service training) in 4 countries**, as per the current scene and needs either at schools, institutions or educational centers. It also offers **blended learning opportunities for students** to acquire these targeted digital skills through the setting up of the CLUBS to be run in a flexible way (e.g. summer schools, after-school lessons, clubs).

Within this framework, the last part of the IO5 focuses on:

- The **Digital strategy** that schools and other institutions could adopt (**5.2.a**)

- The actual CODESKILLS4ROBOTICS **Tool Kit Piloting implementation** in the three partner countries (**5.2.b**)

Hence, in the first section an endeavor is made to demonstrate clearly the steps that partner organizations followed in order to boost the digital profile of their associated schools/institutions where all the piloting schemes took place. The second section delineates the specific information and details pertinent to the **Tool Kit Piloting implementation** at **schools** or **in house**. Schools and other educational organizations/Centers that would be interested in implementing CODESKILLS4ROBOTICS program can make use of the diverse and detailed information provided and customize it to meet their needs.

5.2.a. Digital School Strategy

The development of the **Digital School Strategy** involves a series of important steps to be taken prior to the implementation phase by each partner country, which are analytically described below:

C1-Short Term Joined Staff Training

The implementation phase of the CODESKILLS4ROBOTICS program took place in each partner country after the **C1-Short Term Joint Staff Training** that was held online from 5 to 9 October 2020, where the teachers from selected schools or in-house were trained to be **Mentors**. In particular, the C1-Short Term Joined Staff Training saw the participation of the following number of teachers from Greece, Cyprus and Sweden:

Four teachers participated on behalf of P1, N.C.S.R. "Demokritos'' and **nine** teachers on behalf of P5, the Hellenic Mediterranean University. Additionally, from P3, the Regional Directorate of Primary and Secondary Education of Crete, **eighteen** teachers primary school teachers took part in the relevant training. On behalf of P4, Emphasys Centre, **three** teachers took part, while **three** teachers were involved from P6, Halsingland Education Association. Following the Training event each partner proceeded in cooperation with the associated schools with the next key actions to be outlined below:

Revision and localization of the TOOL KIT so that the SCHOOL DIGITAL STRATEGY is designed

On the basis of the guidelines and the good practices that are presented in detail in the first part of IO5, schools and other educational institutions in each partner country, drawing on the variety of the pedagogical and communicational material of the Tool Kit, along the possibilities of digital development delineated, have made their context specific choices in accordance with their needs.

Greece

Regional Directorate of Primary and Secondary Education of Crete

Regional Directorate of Primary and Secondary Education of Crete, despite the prerequisite for one school, aiming to increase the number of students engaged in educational robotics has opted to participate in the project with four schools from all regions of Crete, namely, **19th Primary School** in Heraklio, **Tavronitis Primary School** in Chania, **Plakias Primary School** in Rethymno and **Nea Anatoli Primary School** in Agios Nikolaos.

Generally, particular emphasis was decided to be given to the familiarization of students with the e-learning platform so as to enable them to be engaged in self-studying, as blended learning requires. Nonetheless, each school made use of the Tool Kit content so as to cater to the school specific needs and potential. Hence, the differences in terms of the school environment characteristics and the teachers comprising it have led to diversified digital strategies to be followed, according to the school background knowledge in the field.

More specifically, Plakias Primary School and 19th Heraklio Primary school have their own Robotics Lab fully equipped and have been awarded prizes in School Robotics Competitions in the past. Hence, the fact that they had sufficient technical equipment and their teacher experts had previous experience in STEM and Robotics skills has allowed them to design their strategy oriented in such a way, intending to work in depth with the teaching material of **Module 1** and **Module 2**.

Tavronitis and Nea Anatoli Primary School, on the other hand, lacking equipment and previous experience in terms of educational robotics opted to develop their strategy so as to pay special attention to the acquisition of basic STEM and robotics Skills so that all novice students would become familiar with them, mostly focusing on **Module 1** and the potential implementation of **one** teaching creative scenario from **Module 2.**

Demokritos:

Demokritos has participated in the pilot testing with two primary schools, the **3rd** and **11th** primary schools of Marousi. The two schools are located in the same building and so it was easy to set up the CODESKILLS4ROBOTICS Club and children from both schools participated. The schools had some previous experience with European programs, but not with educational robotics programs. Since there was no previous experience in educational robotics, we paid attention to the acquisition of basic STEM and robotics Skills, thus focusing on **Module 1** and the implementation of the Culture scenario of **Module 2**. Part of the training included the familiarization of students with the e-learning platform as a part of the blended learning approach.

Hellenic Mediterranean University

Hellenic Mediterranean University participated in the pilot testing with the **12th Primary school** of Heraklion Crete. During the last five years the administration of the school has been trying to involve the students in STEM activities including educational robotics and critical thinking. During the years 2018 and 2019 the school participated with great success in the competitions of WRO Hellas with important distinctions at local and national level. The school has also participated in a number of European projects with great success. The school had sufficient technical equipment and appropriate classrooms to implement activities related to the use of computers and educational robotics. Hence, on the basis of its background, the digital strategy designed would aim for students to become actively involved in both **Modules 1** and **2**.

Finally, a significant number of the school's teachers expressed particular interest in the program's ideas and the educational material, resulting in their participation in the CODESKILLS4ROBOTICS Ambassadors community, by submitting the Memorandum of Digital Commitment electronically.

Cyprus

Emphasys Center

Emphasys Centre organised the pilot testing **internally/in-house**. Emphasys Centre is fully equipped with human resources as well as the facilities and tools required for the implementation of the activities of the project. The Cyprus team involved 4 teachers (2 experts with Computer Science background and 2 assistant teachers, one with Computer Science background and the other with Architecture and Civil engineering background) and 27 students in total to ensure the effectiveness of the products (framework, syllabus and teaching material). The team is experienced in organising similar pilot testing, as it is actively involved in other projects.

Sweden

Halsingland Education Association

Halsingland Education Association participated with **Stentägtskolan** from the municipality of Söderhamn. Since Stentägtskolan lacked materials and had only limited experience in building and coding robots among teachers and students, it was chosen to work at a basic level and focus on **Module 1** and potentially on one of the scenarios of **Module 2**.

Offering training (school-based/in house) for teachers and parents

Besides the Short term Joined Staff Training, local training (school-based, in-house) was organized by each partner country with the support of the experts, so as to empower the involved teachers and parents to implement the TOOL KIT.

Greece

Regional Directorate of Primary and Secondary Education of Crete

Following the C1 training, Regional Directorate of Education of Crete has supported the participating school teachers to develop and implement the digital school strategy, bearing in mind their specific individualized training needs. Within this framework, several meetings were held online as a result of the pandemic restrictions, whereby all the steps to be followed were analytically planned and revised prior the implementation of piloting of the Tool Kit. Hence, under the guidance of the teacher experts the framework of the time schedule to be followed along with the teaching content was revised, supporting and empowering the teachers who would implement the piloting phase. Besides the content and time arrangements, an additional online training took place with the participation of the Project coordinator so as to offer additional training and further clarification feedback regarding the e-learning platform and the teaching modules, aiming to enhance teachers' skills and boost their efforts prior to commencing the piloting testing at schools.

The vital role of the volunteer CODESKILLS4ROBOTICS experts, Mr. Katsios, Mr Katsaris, Mr. Roniotis , Mr. Anastasakis and Mr Orfanankis, should be stressed at this point, as it has been conducive to the successful implementation of the project by their contribution in terms of technical support to teachers and students due to their expertise and previous experience in the field of coding

and robotics, but additionally in terms of developing teaching scenarios in the case of Plakias school experts. In fact, the case of the volunteer expert of Nea Anatoli Primary School, who is also the president of the parental association, illustrates the significant role of the expert, as that having a dual role both as an expert and a parent, this would reinforce and extend the training seminars to parents as well, which would contribute the most to the sustainability of the project within the parental population.

Besides the significant role of experts, in the case of RDPSEC it is worth mentioning the keen interest and the highly developed motivation of the teachers that have been instrumental in the successful implementation of the project, which offered them chances for professional development through the enhancement of their digital profiles. Their very active involvement at all stages can be said to have an added value given that due to pandemic restrictions teachers in Greece had to work under very pressing conditions, which made the implementation of the piloting all the more challenging and demanding for them.

Demokritos:

Eirini Chaidi who is the principal of the 11th primary school of Maroussi, participated in the C1 activity. She then approached us in order to implement the pilot testing of our program at her school. Eirini Chaidi got informed about our project and she helped us to organize a training day- intensive course, with the participation of parents and teachers. In this training day, which took place online due to the covid-19 limitations, parents and teachers were informed about the aims of the project, the educational material produced, based on a real time demonstration and explanation of core subchapters of the available modules. In addition, they were informed about the importance of 21st century skills in both the professional development of teachers and the future life of their students and children. This contributed a lot to more parents and teachers getting informed about the significance of introducing educational robotics to primary schools and to the dissemination of our project.

Hellenic Mediterranean University

Ioannis Galanakis the principal of the 12th school in Heraklion Crete along with Anastasios Riggas the ICT teacher of the school have been trying for the last five years to involve the students in STEM activities including educational robotics and critical thinking. Although the pandemic restrictions made the coordination of the teachers with the parents difficult, the students participated in the CODESKILLS4ROBOTICS Pilot training with great success. In addition, several parents have shown great interest about the role and the objectives of the program. Also, due to the pandemic limitations, part of the education and cooperation of students with teachers took place using the Webex platform. Especially for the theoretical part of module 1 and the provision of clarifications.

Cyprus

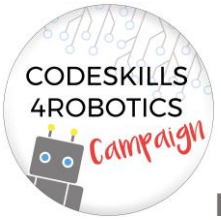
Emphasys Center

The parents played an important role in implementing this pilot testing, as they are those who make the decisions for their children's future. Emphasys Centre's main aim was to inform the parents first by letting them know about the importance of STEAM skills acquisition. Thus, through the activities organised, Emphasys staff members have presented the project's aims to the parents and introduced them to the world of robotics. Moreover, the activities were organised so that parents could get involved and support their children. A group on social media has been created where the teachers were sending photos and videos taken during the face-to-face sessions to keep the parents updated. Last but not least, Emphasys Centre organized another INFO DAY (As part of the EU CODE WEEK) at the end of October 2020 and invited all the parents to join their children during their class.

Sweden

Halsingland Education Association

During week 44, 26-30 October, a teacher training is held every year in Sweden. In Söderhamn, a half-day activity had been planned with the CODESKILLS4ROBOTICS Programme for teachers in primary schools. Due to the pandemic, the training was cancelled. Therefore, the information provision about and the training within the CODESKILLS4ROBOTICS program changed. A digital, interactive contact with 80 teachers in preschool classes, primary schools and leisure centres was held instead. This has been very fruitful, since four new schools are going to be invited to implement the CODESKILLS4ROBOTICS program. Parents have been informed about the project. Initially Ylva Bjelksäter was engaged as a technical expert. During the project, she has also contributed in the sense of educating both students and teachers. She has been of great use and importance for the progression of the project.



Promotion of the project through the campaign IO

The CODESKILLS4ROBOTICS program was promoted by means of a targeted online social media and or offline Campaign by each partner country and/or in some cases local and national media campaign schemes. In this way, the project aims, intellectual products, educational material and e-learning tools, pilot results were disseminated to the target stakeholders and the general public through various visual aids, posts on events and sharing relevant project links, informative brochures and press releases on a national and European level, aiming at enhancing project dissemination, visibility and sustainability. The specific **Campaign** followed by each partner prior to and throughout the Tool Kit implementation phase is analytically presented below:

Greece

Regional Directorate of Primary and Secondary Education of Crete

Regional Directorate of Primary and Secondary Education of Crete has under its supervision all primary schools and their teachers in the four regions of Crete, which means that there is a vast network of schools and teachers available to implement as associated partners the various European Erasmus+ projects in which RDPSEC participates.

In the case of CODESKILLS4ROBOTICS program, an **initial informative** and **raising awareness campaign** took place by means of emails sent to all schools, informing them on the program, its aims, its target group and inviting them to express their interest to participate in its implementation. In direct communication and cooperation with the four Education Coordinators comprising RDPSEC project Pedagogic team, among the schools that expressed their interest to participate in the program the final choice was made on the criterion of representation of schools from all regions, both rural and urban

ones and on the basis of the existence of volunteer experts in those schools that would support the teachers involved in project piloting implementation. Although the program requirements were for at least one school and 10 students per partner, it was decided that more schools should be involved in an attempt to promote **STEM** and **robotics skills** to a wider student population in Crete.

Besides the initial informative campaign for school selection purposes, a **systematic online communication** and **dissemination Campaign** was run before the Tool Kit implementation phase, by means of a series of **social media** posts on the European Program Facebook Page, which counts a great number of target group followers from schools in Crete. Hence, through shared articles on Robotics, visual material for raising awareness and informing on various events and trainings, brochures and invitations for webinars and Info-days, special visual posts, directing the audience to the Project intellectual outcomes, the project results were disseminated to the local stakeholders, teachers, parents and the wider student population. Particular emphasis was also placed on establishing the project visual identity to the eyes of the audience, by having the project Logo and its colors featuring prominently, as well as on sharing links of the project official website, e-learning platform, e-newsletters, memorandums of digital commitment, aiming to reach those interested in visiting them and subscribing, so as to become program **ambassadors** and keep track of the project in progress.

Moreover, a more **targeted Online Dissemination Campaign** took place during the period of Piloting Testing in Cretan schools, aiming to promote the project results, the educational material and the e-platform tools to relevant stakeholders and arouse the interest of more schools and educational institutions that would like to implement the project. Specifically, before the onset of the pilots at schools RDPSEC created a **pilot-training Facebook group**, which aimed at facilitating the communication and exchanging experience among the members of the piloting schools, while at the same time, acting as the medium for sharing the material and piloting action student moments in order to disseminate the CODESKILLS4ROBOTICS Program to the wider teacher and student population.

Apart from social media, special reference should be made to the **Dissemination Campaign** launched by RDPSEC in the various **local** and **national media** for the period from 12 February to 31 March, by means of press releases, articles on **local press** and **National press (Athens-Macedonian News Agency)** and news portals, special **TV shows** tributes on local TV

Channels and Radio Programs. Thus, the project aims and results, piloting photographic material and testimonials from the involved teachers and students were communicated to a broad and diversified audience, ranging from teachers, parents, students, stakeholders and the wider general population of the local community but on a national level as well as a means to enhance project visibility, exploitation and sustainability efforts.

Finally, the **Online Multiplier Event** organized by Regional Directorate of Primary and Secondary Education of Crete was also broadcasted at the RDPSEC You-tube channel, giving the chance to be attended by a larger audience and enhancing in this way the prospects for the greater dissemination of the project and piloting results.

Demokritos:

A **campaign** was initially implemented to promote the project and its aims, which was more focused **on face-to-face** and **telephone meetings** with schools, school leaders, teachers and parents it collaborates with already in the framework of its educational activities such as the annual seminars and the postgraduate degree program it implements in the last few years. Apart from the large network that has been created over the years with the target group, Demokritos had the opportunity to inform its active students of the aims and goals of the project first hand during classes. Due to the pandemic it was deemed safer to recruit and collaborate with more familiar people rather than send out an open invitation to schools and teachers in the Athens area for the pilot implementation of the toolkit in schools through the CODESKILLS@SCHOOL Clubs. In addition, it is proven that schools and teachers generally prefer a more direct communication and this is another reason why this course of action was preferred over online tools in order to establish a concrete collaboration for the implementation of the training program. Through this campaign, the principal of the 3rd Primary School of Marousi was contacted, who showed a real interest in the project and qualified as the most suitable person/school to collaborate with for the toolkit pilot testing.

Having said that, a **rigorous online campaign** also took place in parallel, aiming at the aforementioned target groups as well as the general public in order to promote educational robotics and specifically the results of the project,

including the educational material and the e-tools to attract the interest of more schools and teachers who may be interested in implementing such activities in their schools with their students and thus, ensure the visibility, sustainability and exploitation of project results.

The guidelines as well as the visual material (flyers, brochures, promotional badges, presentation templates, poster) that were developed for disseminating the project and raising awareness were brought to the forefront of this campaign through social media channels (both those of the project as well as those of the organization, which counts thousands of followers mainly from the target group) using imaginative and slogan-based posts with emojis, images, videos, links to related articles, hashtags. Emphasis was also given on including links to the developed e-tools (website, e-learning platform, mobile app, e-newsletters, memorandums of digital commitment - ambassador forms) in order to invite people to visit them, register and/or subscribe and follow closely the progress of the project. Finally, the logo and the colors of the project were used extensively in an attempt to make the CODESKILLS4ROBOTICS project instantly recognizable and make our audience accustomed and familiar with it.

Hellenic Mediterranean University

In order to inform its audience about the CODESKILLS4ROBOTICS programme, Hellenic Mediterranean University ran an **online campaign** through its websites and social media page, aiming to raise awareness about the STEAM skills and educational robotics. There has been cooperation with RDPSEC in the context of the dissemination of the program, since the 12th primary school belongs to its responsibility. In fact, there was a publication in the **local press** presenting the results of the program as well as impressions from participants during the pilot implementation. Also, HMU participated in the multiplier event organized by the RDPSEC and presented a part of the educational pack and the results of the IO1.

Cyprus

Emphasys Center

Emphasys Centre ran an **online campaign** through its social media page aiming to inform tis audience about the CODESKILLS4ROBOTICS programme and raise awareness about the importance of STEAM skills acquisition. As an ICT training centre, Emphasys visibility is focusing on the digital skills and more specifically on programming, robotics and coding skills.

Moreover, Emphasys had the opportunity to run an **offline campaign** as well with its participation at national dissemination activities, where an opportunity for presenting the CODESKILLS4ROBOTICS project and its result was given.

Sweden

Halsingland Education Association

Halsingland Education Association has implemented a **social media campaign** on the organization´s Facebook group, where news and current activities are continuously published on our Facebook account. Videos from C1 and C2 and the pilot activities were published on Facebook and YouTube. In connection with in-service training days for teachers, an information session was received, where the CODESKILLS4ROBOTICS program presented to more than 150 teachers in Söderhamn municipality. Photos from the event were published on Facebook. In addition, local media -have published articles and photos from activities during C1.

Organization of an Info DAY for parents, students, teachers, associate partners, mentors etc.

An info day always presents an excellent opportunity for information sharing, familiarization and raising awareness of all the involved stakeholders i.e. parents, students, teachers, associated partners, mentors regarding the Tool Kit implementation at their schools. Due to the pandemic restrictions some of the relevant events were organized on line, as outlined by each partner in the following sections:

Greece

Regional Directorate of Primary and Secondary Education of Crete

Two **info days** were organized by RDPSEC on the occasion of two different European and International days.

The first **Info Day** was held face to face in the open space of the RDPSEC premises on October 15th and 16th 2, when Erasmus+ Days 2020 were celebrated, during which among other RDPSEC European Programs in progress, the CODESKILLS4ROBOTICS program aims and products were disseminated by means of posters, flyers and banners to students, educators and teachers.

The second CODESKILLS4ROBOTICS **Info Day** was organized **Online** by RDPSEC on 11th February 2021, on the occasion of celebration of the International Day of Women and Girls in Science, with the strong presence of the piloting group students from Plakias Primary School, where girls being the protagonists of the day shared a few words of their experience of piloting so far. During the online Info day session, teachers from various schools all over Crete, who expressed a heightened interest in STEM and Robotics skills, had the chance to be informed about CODESKILLS4ROBOTICS program, its aims, the e-learning platform and the content of the teaching material so as to implement the program with their students. Participants were also invited to become CODESKILLS4ROBOTICS **Ambassadors** and Sign the **Memorandum of Digital Commitment,** so as to promote the project to the wider teacher communities and networks they are members.

Demokritos

An **info-day** was organized, which took place online due to covid-19 limitations, where parents and teachers were informed about the aims of the project, the educational material produced and the use of our online tools (e-platform, mobile app, open badges). In addition, the website, social media, newsletter etc. were presented to them for dissemination purposes. For more info, please refer to the section above.

Hellenic Mediterranean University

Although Hellenic Mediterranean University had planned to organize a face-to-face info day at the control systems and robotics laboratory of HMU, this did not take place due to the corona pandemic restrictions and difficulties at that period. Nevertheless, HMU participated in the online info day organized by the RDPSEC with teachers from the 12th Primary school of Heraklion.

Cyprus

Emphasys Center

Emphasys Centre participated in **various national events**, where the opportunity for dissemination was given prior to the pilot testing. Such as events were:

a) its participation at the International Education and Career fair 2020 organized in Nicosia on annual basis

b) the organization of an Info Day at the 40th Scout Troop as part of the EU Robotics Week,

c) the organization of an INFO DAY at Ayios Dimitrios Primary School organized by the parents' association.

During the events, students had the opportunity to get hands-on experience with their involvement in various robotics activities, and their parents got informed about the upcoming training of CODESKILLS4ROBOTICS so as to understand the importance of the STEM skills acquisition.

During the pilot testing, Emphasys Centre organized another **INFO DAY** (as part of the EU CODE WEEK), where parents were invited to join various activities designed for the whole family.

Sweden

Halsingland Education Association

For Halsingland Education Association it wasn't feasible for an info day to be organized face to face due to the corona pandemic. The Covid 19 threat has severely limited the opportunities for physical encounters. Hence, it was decided that Information to parents would be provided through weekly letters that teachers sent home with the students to their parents. Accordingly, an **interactive digital information** has started with 80 teachers. The e-mail correspondence has resulted in a great deal of interest among the teachers and four schools have so far registered their interest in taking part in the CODESKILLS4ROBOTICS program.

Setting up the Participants' Committee with representatives of the teachers and students

A CODESKILLS4ROBOTICS Committee was set up in each participating school which was comprised of the headteacher and or teacher-mentors / experts and students' representatives, participating in the piloting implementation phase of the Tool Kit. The role of the committee would be to guarantee the successful implementation of piloting testing and the continuation and sustainability of the Program and the commitment to the principles and priorities of the project.

Greece

Regional Directorate of Primary and Secondary Education of Crete

The four piloting schools of the Regional Directorate of Primary and Secondary education of Crete formed their own school Participants committees, which consisted of the school principal and a teacher expert or a teacher mentor, along with four student representatives of those participating in the piloting group of each school as follows:

Plakias Primary School Participants' Committee comprised of the school principal, Mr. Andreas Vedouras, the teacher-expert, Mr. Kostas Katsios and four (4) students, Mrs. Michaela Tzanidaki, Mrs. Nikoletta Fragkedaki, Mr. Markatsakis Giannis and Mr. Giorgos Politakis.

Nea Anatoli Primary School Participants' Committee was composed of the school head teacher and teacher-mentor, Mrs. Emmanouela Daskalaki, the teacher expert Mr. Giannis Fragkoulis and four (4) students, Ms. Nina Golemi, Ms. Rosela Mollanji, Mr. Ntaniel Yvanai, and Mr. Sehit Asllani.

Tavronitis Primary School Participants' Committee comprised of the school principal Mrs. Galanaki Chara, the teacher-mentor, Mrs. Fotini Dimopoulou and four (4) students, Mr. Christian Belba, Mr. Eythimios Paterakis, Mr. Tzirtzilakis Giannis and Ms. Marina Naydenova.

19th Heraklio Primary School Participants' Committee was constituted of the school principal Mr. Ioannis Chachlakis, the teacher expert Mr. Alexandros Roniotis and four students, Ms. Lorentana Sarri, Ms. Fetokaki Maria, Ms. Stefanaki Marina and Mr. Antonis Mavrantonakis.

The mission of the Committee was to support efforts for successful implementation of piloting at their schools and promote projects results to the rest of the teacher and student population of their school and overall sustainability actions after the completion of the project.

Adult participant Committee members took part in the preparatory meetings, held online due to the pandemic restrictions limiting physical contact, prior to commencing the pilot testing in order to agree on matters regarding timetable, teaching content and covid-19 restrictions. They were responsible for distributing and collecting all the necessary pilot documents sent by email pertinent to parental consent forms for participation and taking photos and student registration.

Throughout the piloting phase there were frequent telephone and email communications among the Committee members and RDPSEC Pilot Coordinator to discuss pilot progress, any difficulties and provision of support, while upon the Completion of pilots under the support and guidance of RDPSEC they contributed to the collection of the Evaluation forms and Project report documents etc. Their overall involvement was important for the successful CODESKILLS4ROBOTICS Tool Kit Piloting implementation in the four schools against pandemic barriers.

Demokritos

A 'Participants' Committee comprising the principal of the 11th Primary School of Marousi, Mrs. Eirini Chaidi, the teacher-mentor Mr. Chrysovalantis Kefalis and four (4) students Ms. Eleftheria Soulioti, Ms. Vanessa Kreka and Mr. Loukas Lanthimos and Mr Athanasiou Charalampos was set up at the very beginning of the pilot training implementation.

An initial meeting took place prior to the beginning of the pilot training to discuss the logistics for the training (venue, available equipment, number of

students, timetable, Covid-19 precautions, syllabus, etc.) with all parties reaching an agreement. Finally, all the necessary paperwork regarding parental consent on participation and permission to take photographs for all participating students was collected and all members committed to guarantee the successful implementation of the training.

A second meeting took place online, when the new pandemic measures forced the pilot training to continue remotely in order to arrange the new timetable and discuss the new situation and how the training will take place. Finally, a third and final meeting took place at the end of the pilot training in order to gather all the evaluation questionnaires from all involved participants and to discuss the possibility of continuing the educational robotics classes at a later date and in person when the pandemic is over.

Hellenic Mediterranean University

The Pilot testing was implemented at the 12th Primary school of Heraklion with the guidance of the Hellenic Mediterranean University. An implementation time schedule was made, and a Participant Committee was established to improve the coordination between HMU, teachers and students along with their parents. The committee was composed mainly by Mr. Ioannis Galanakis, the principal of the 12th Primary school, Mr. Anastasis Riggas the ICT expert teacher of the school and the teacher Mrs. Sofia Karapataki. Finally, in the above committee the following students: Vezirtzoglou Aikaterini, Kechagia Mirto, Vasilakis Emmanouil and Nikolaos Xylouris participated.

Many issues were addressed such as the necessary paperwork, the parental consent, the available equipment, the venue, the evaluation questionnaires and the Covid-19 precautions. Due to Covid-19 restrictions all the communication between the school and the HMU became through email and telephone calls.

Cyprus

Emphasys Center

The staff of Emphasys Centre who got involved in the piloting implementation are members of the Participant's Committee, as well as students who have shown a great interest in the project's results. Specifically, Emphasys Committee comprised of two teachers, Mr Nikolaos Moudouros and Mrs Demetra Orthodoxou, along with four students, Kyriakos Flouros, Seby Berzi, Alexander Ioannou and Daniel Andreou. The committee members are willing to offer any kind of support to re-implement the project in the next academic year.

Sweden

Halsingland Education Association

Halsingland Education Association participants' committee consists of two teachers, Mr. Jonas Andersson and Mrs. Ylva Bjelksater and four students: Mille Gustafsson, Bob Åhnstrand, Elias Chabchouboch Stefan Nijimbere Irambona. Students and teachers agree that the pilot activities were both educational and fun. Several students want to be part of the CODESKILLS4ROBOTICS program, and as a result a new group of 10 students will start piloting the week after Easter, 14 April 2021.

Establishment of SYNERGIES and setting up the DIGITALSKILLS@SCHOOLS CLUBS in order to sustain the project's results

Each partner country, having provided the piloting schools with the necessary guidance and support to create synergies and set up their DIGITALSKILLS@SCHOOL CLUB proceeded with a systematic effort for project result sustainability, inviting schools and teachers to sign an electronic Memorandum of Digital Commitment for Schools and a Memorandum of Digital Commitment for Organizations so as to become project ambassadors and disseminate the project results to more schools and educational institutions and overall to reinforce the formation of synergies.

Greece

Regional Directorate of Primary and Secondary Education of Crete

RDPSEC by means of emails and online meetings provided all the necessary guidelines to the piloting schools in order to set up the Digital@school Club and invite its members to sign electronically a **Memorandum of Digital Commitment** for **Schools** to enhance project results dissemination and sustainability along with synergy creation efforts. Besides the school principal and the teachers involved in the pilots, other members of the school teaching staff were reached and signed the **Memorandum of Digital Commitment** so as to become COSESKILLS4ROBOTICS **ambassadors**.

Additionally, guidelines were also given to become members of the CODESKILLS4ROOTICS **eTwinning group**, as means to disseminate and sustain the project results among eTwinners, which is a very active group in Greece, providing an excellent opportunity for the dissemination of the project results among the extended teachers' community on a national and European level.

Besides the four associated schools, after the completion of the project, all primary schools supervised by the RDPSEC, will be invited to sign the Memorandum of Digital Commitment by means of an emailing campaign, while being informed by project newsletters on its final results, its IOS and the e-

platform tools and material, aiming to attract the interest and recruit more schools that would like to implement the project in the future.

Demokritos

Through the aforementioned campaign an effort was made to attract and recruit **ambassadors** for the project. Two electronic Memorandums of Digital Commitment were prepared, one for **schools** and one for other **organizations** and invitations were sent out to potential ambassadors either via email either via the social media and other channels (face-to-face, phone calls, etc.).

The network of schools and teachers that Demokritos collaborates with was informed of the project and those interested in the project were asked to fill in the online form and become **ambassadors** of the project to their schools and peers in order to create synergies and find ways to bring the results of the project specifically and educational robotics in general to their schools.

The setting up of the DIGITALSKILLS@SCHOOL Club in the 3rd and 11th Primary school of Marousi and the pilot implementation of the training combined with the publication of the results to other schools and the general public with the lesson learned, pitfalls, etc. will be the roadmap and the beginning of collaborations and synergies among teachers and/or schools in general.

Hellenic Mediterranean University

In order to enhance project results, dissemination and sustainability, HMU had intensive coordination with the Participants Committee of the piloting school. HMU had a close collaboration with the above committee via several emails and online meetings by providing the necessary guidelines to set up the DIGITALSKILLS@SCHOOL CLUB and inviting members of the school to sign a Memorandum of Digital Commitment electronically. With this in mind, a Memorandum of Digital commitment was signed by at least 12 teachers to become CODESKILLS4ROBOTICS **ambassadors** besides the school principal and those involved in the pilots.

Cyprus

Emphasys Center

For the set-up of the DIGITALSKILLS@SCHOOL CLUB as part of the DIGITAL STRATEGY OF PRIMARY SCHOOL, Emphasys Centre created synergies among various organisations, public and private schools as well as authorities:

- Cyprus Computer Society (CCS)
- 3rd Kaimakli Primary School
- Ayios Dimitrios Primary School
- 40th Scout Troop Egkomi
- Ephorate of the Greek Schools of Nicosia

Sweden

Halsingland Education Association

The headteacher of Stentägtskolan, Jonas Andersson and his colleagues at Stentägtskolan have been invited to sign the Memorandum to become **ambassadors** of CODESKILLS4ROBOTICS program. Likewise, Ylva Bjelksäter has been invited. As a result of the digital, interactive information, four new schools will start new clubs. Together with Stentägtskolan, KomTek will act as a guarantor for the project's sustainability and dissemination to other schools in Söderhamn municipality.

Making all practical arrangements (venue, equipment, trainers, etc.)

The partner countries have made the necessary organization arrangements and provisions pertaining to venues, trainers, making sure schools have the necessary equipment needed to implement the TOOL KIT etc. More specifically:

Greece

Regional Directorate of Primary and Secondary Education of Crete

Regional Directorate of Education of Crete provided the necessary technical support and guidance on the technicalities of the platform by means of online meetings and webinars for all participant schools. Additionally, there was provision for eight Lego Boost kits and tablets for the piloting schools. The participants' committee members were responsible for safeguarding all the hygienic conditions necessary for the implementation in all schools.

Demokritos

The principal of the 3rd primary school of Marousi made all the necessary practical arrangements for the required infrastructure and provisions (Internet connection, projector, classroom availability), as well as all the hygienic arrangements (antiseptic, open door and windows during the training) to ensure that the pilot trainings will be carried out safely for everyone involved.

On the other hand, the teacher-mentor provided the necessary equipment to the school (Lego boost kits, tablets, laptop, etc.) in order to successfully implement the pilot training and also his guidance on technical issues as an I.T. expert.

Hellenic Mediterranean University

Hellenic Mediterranean University provided the necessary technical support and guidance of the platform, as well as all the hygienic arrangements for the face-to-face pilot implementation of the Tool Kit.

Cyprus

Emphasys Center

The piloting implementation was organised at Emphasys Centre. As an ICT training centre, the centre is fully equipped with the latest technological equipment (laptops, interactive whiteboards, robotics kits, etc.) and experienced trainers who got involved in the CODESKILLS4ROBOTICS training.

Sweden

Halsingland Education Association

Halsingland Education Association has bought 14 Lego Boost kits and a number of learning tablets. The students have been able to work F2F. The teachers received all the information they needed and they have good knowledge of the Platform's possibilities. Students have worked two and two and sometimes three and three with the material. Students' skills to work in teams have been trained and developed.

Organization of competitions etc.

The initial plan involved organizing a national competition among participating students in the piloting groups, the four winners of which would be given the chance to travel to Brussels to take part in C2 Training Activity, as budget limitations didn't allow the trip for more than four students. Due to Covid-19 pandemic restrictions, since the C2 Training was eventually planned to take place online from 16 to 19 March 2021, it was decided that there was no need for the competition to be held, as all students from all countries would be invited to participate online by demonstrating their portfolios of work during **C2 Training Activity.**

Hence, from **Greece**, regarding RDPSEC schools, **8** student representatives from Plakias Primary School, **4** from 19th Heraklio Primary school, along with **6** HMU students form 12th Heraklio Primary school and **5** students from Demokritos schools participated, exchanging their ideas and sharing a fruitful learning experience with **4** students from Emphasys Center in **Cyprus** and **4** students form Halsingland Education Association in **Sweden**.

Monitoring and evaluation as per the guidelines of the Tool KIT

Each partner country monitors the implementation phase of the TOOL KIT so as to ensure that the guidelines given are followed.

Greece

Regional Directorate of Primary and Secondary Education of Crete

The Regional Directorate of Crete piloting implementation started on a preparatory stage at some schools on 18 December and lasted until 8th March. As prior mentioned, during this period besides the initial online meetings and contact aiming to provide the guidelines and the necessary piloting documents regarding the procedures to be followed for the piloting implementation of the Tool kit there was frequent either email or telephone contact and communication of the RDPSEC Pilot Coordinator with the piloting schools so as to ensure that all guidelines were followed, monitor the progress of the piloting implementation and provide support and assistance in case of difficulties encountered. It is worth mentioning that all the involved parties form the piloting schools exhibited a notable cooperative stance, which was highly conducive to the successful implementation of the piloting testing despite pandemic difficulties.

Demokritos:

The piloting testing started at the beginning of February until 30 March 2021. Since 11th February primary schools were closed by the government due to pandemic restrictions. The training however, continued online using Webex platform (the official platform of primary schools). The students had little prior knowledge on coding and robotics so it was decided to give extra attention to section A of module 1 (Basic Robotics Movements) and thus we spent more time than our initial intention on that subject. This decision has proved to be right because the other sections of module became easier to follow by the students.

Hellenic Mediterranean University

In order to ensure the proper implementation and utilization of Tool Kit, as mentioned before, there has been continuous communication between HMU and the school's Participants Committee using e-mail or telephone communication.

Cyprus

Emphasys Center

Emphasys Centre was the first organisation which started the piloting implementation of the project. Emphasys Centre was one of the key partners for developing the teaching material and, more specifically, the Head of Training Department, Mr. Nicholas Moudouros, who is an IT expert.

Due to that, Emphasys Centre organised in-house (face-to-face) the piloting implementation of the project, starting from September 2020. In December 2020, the second wave of the pandemic hit the island, so Emphasys Centre had to interrupt the pilot testing in order to safeguard the health of students and teachers, although a tremendous amount of the material had already been tested by then. A series of short online sessions were organised during January and February 2021 to refresh the knowledge and prepare the students who participated in C2.

Sweden

Halsingland Education Association

HEA piloting implementation classes have been fulfilled face to face. Students from Stentägtskolan have used KomTek's premises, which are very well equipped for laboratory work in the STEM area, with piloting activities starting 03 February and the first group finishing their piloting on Wednesday 3rd March 2021.

Assessment and validation of the skills proceeding with the endorsement of the Open Badges

Prior to commencing the Tool Kit Pilot implementation, the consortium had reached the decision that the Open Badges as a means of validation of the skills to be acquired would not be awarded to each student on the basis of a specific score achieved primarily on the basis of the students' performance in terms of Coding and S.T.E.M. skills. Instead, each teacher-mentor would award the badges, taking into consideration the overall progress of students throughout the piloting implementation phase, in terms of additional soft skills such as fine motor skills, thinking outside of the box, creativity, persistence of achieving the goal, teamwork and cooperative stance and generally the overall picture of student active participation and engagement in the class.

The rationale behind this decision was that it is **more student-centered** and compatible with the pedagogical nature of leaning per se and robotics in particular. Besides, the educational material is structured and designed in such a way as to require active participation and interaction from students. A small part of the material is taught, some exercises follow and throughout this process students are asked to find solutions through dialogue, exchange of arguments and trial and error. Since this is a student-centered process, the students' evaluation results from their overall performance is perceived by their teachers.

Overall, for the validation of the newly acquired **Robotics skills** a total number of 7 Badges were available to be awarded in the e-learning platform, namely 3 for **Module 1** (Basic, Intermediate and Advanced Levels) and 1 for each of the **4 Creative Scenarios**. The use of the Open Badges as a means of validation was expected to provide an extra incentive for students' engagement and motivation to complete the training program, always bearing in mind that badges would bear a significance to a varying degree in each case.

Hence, in accordance with the Consortium decision each partner organization proceeded with the use of Open Badges, considering the specific contextual factors affecting piloting in each school and the individual student population needs, characteristics, learning styles etc.

The aforementioned preparatory steps, taken by all partners as an element of the digital strategy designed, have led the way to the **implementation** of the **Tool Kit**, which constitutes the focal point of the following section.

5.2.b. Implementation of the CODESKILLS4ROBOTICS Tool Kit

Overall, as part of IO5, each partner country (based on organization's size, expertise etc.) involved a number of students and teachers during F2F and on-line learning opportunities for a period of 6 months to set up the DIGITAL SKILLS@SCHOOLS CLUBS, create the SYNERGIES and teach at least **1 Module**. The duration is approximately 30 hours based on blended learning activities (F2F and on-line). Generally, the implementation of the Tool Kit takes various forms (e.g. intensive summer school, after-school activities) depending on the context of each partner country and organization.

Within this framework, following the necessary actions in line with the specific digital strategy designed, as described in detail before, the actual CODESKILLS4ROBOTICS Tool Kit piloting implementation was carried out by each partner organization, as analytically delineated below.

Overall Piloting Key Demographics

The CODESKILLS4ROBOTICS Tool Kit piloting implementation was conducted either **in-house** or in **selected primary schools** in three EU Member States, through the active support of the project partner organizations, namely, Regional Directorate of Primary and Secondary Education of Crete (**Greece**), NCSR 'Demokritos' (**Greece**), Hellenic Mediterranean University (**Greece**), Emphasys Center (**Cyprus**) and Halsingland Education Association (**Sweden**).

Overall, the Pilot testing of the CODESKILLS4ROBOTICS Program has reached **116 students** and **21 teachers** and **teacher experts** in 8 schools and 1 non-formal educational Training center in **Greece**, **Cyprus** and **Sweden.** As shown in *figure 1.*, **Greece** appears to have reached the greatest number of students, with RDPSEC seeing the highest participation, followed by Emphasys Center in Cyprus.

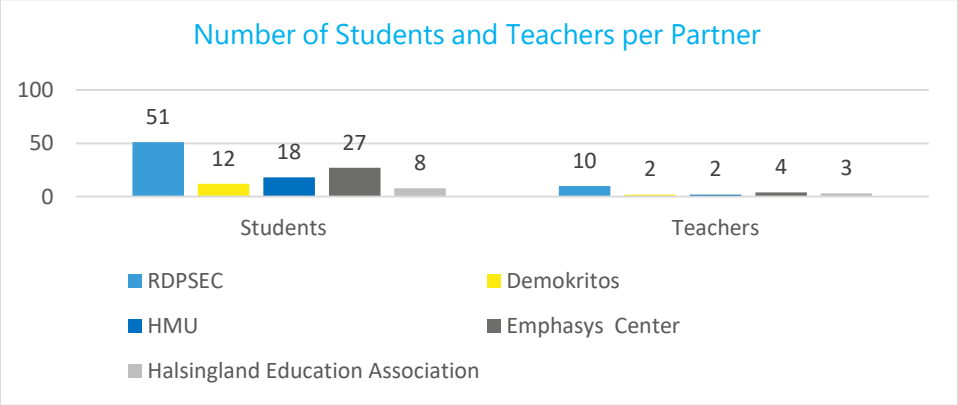


Figure.1. Number of students and teachers per partner

In total, a very satisfactory number of students has been reached, exceeding the pre-requisite number of **50** students minimum, designated in the project proposal. Not only is this overall increased number of students an indicator of the project's successful implementation on a primary level, but it can also be said to be a key factor highly conducive to the project dissemination and sustainability prospects.

Regarding gender representation, on the whole, the overall quite high rate of girls' participation per se (**45**%), signifies a very promising prospect, as the efforts made towards the direction of **increasing the active involvement of girls** in robotics, being among the project initial purposes, seem to have borne fruit. Interestingly enough, as shown in *figure 2.*, it seems that in Greece girls have outnumbered boys, with Demokritos female students taking the lead and achieving the highest rate of participation, closely followed by Hellenic Mediterranean University students.

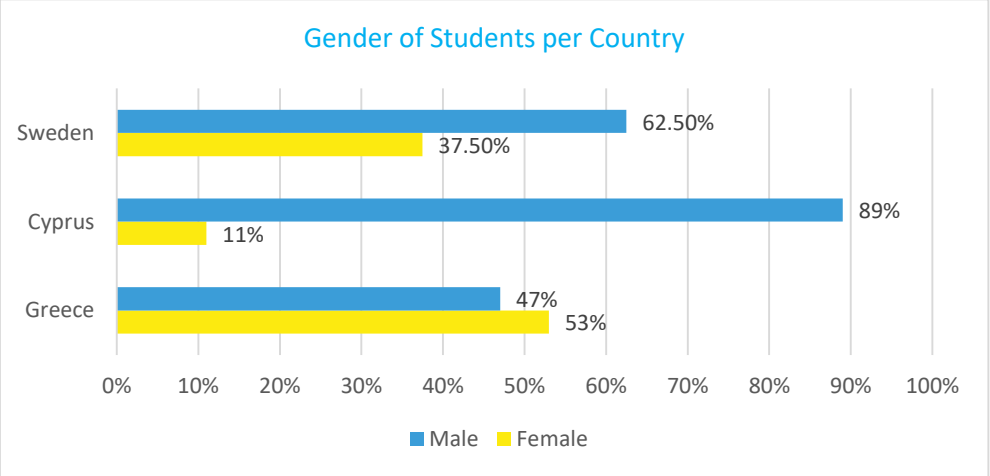


Figure.2. Gender of students per partner

Following the brief presentation of some overall key demographic information, it is expedient to shed more light into the pilot testing process, as carried out by each partner, pertaining to the **participants' characteristics**, the **methodology** adopted, the piloting **schedule** and **content** along with portfolios of work.

Piloting Participants' Characteristics

The participant characteristics per each partner organization related to the type/size of institutions/schools, the participants' number, the subjects taught, the students' classes/age, the special characteristics of the participating schools, the number of badges obtained and their overall student success are analytically presented below:

Greece

Regional Directorate of Primary and Secondary Education of Crete

Overall, the piloting implementation on behalf of the RDPSEC saw the participation of three rural and one urban primary school, a total of **10 teachers** (6 teachers and 4 expert teachers), along with **51 students**, with Plakias Primary school, as shown in *figure 3*, involving the greatest number of students.

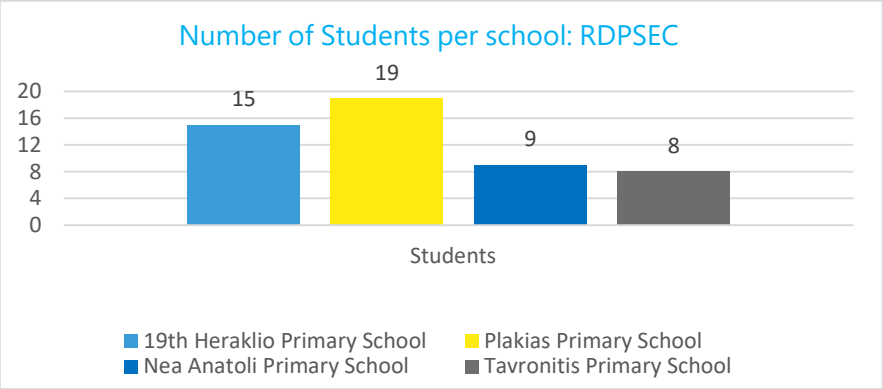


Figure.3 Number of Students per RDPSEC Schools

The vast majority of students (67%) were sixth graders. Interestingly enough, with a slight difference as *figure 4* indicates, **almost an equal number** of boys and girls participated, with boys being 51% and girls 49%.

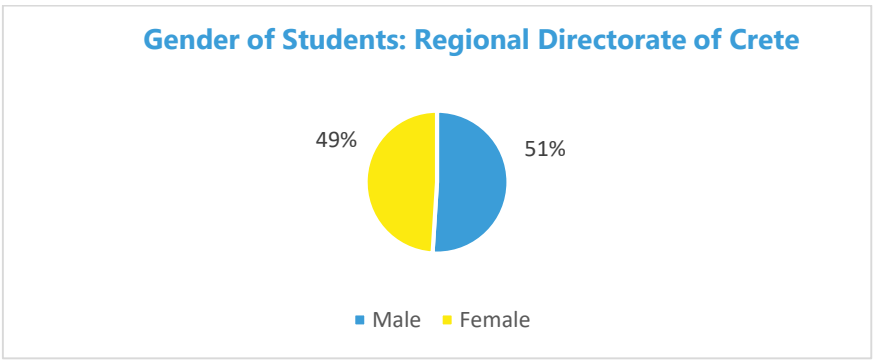


Figure.4 Students' Gender of RDPSEC Schools

The high rate of girl participation in itself is a very positive outcome for RDPSEC pilot testing, as one of the project's intended purposes was the active involvement of girls in Robotics. What is also noteworthy is that both multicultural students and special ability students participated in the pilot groups, expressing heightened interest and enhanced motivation. The specific profile of the four piloting schools is analytically delineated below:

Plakias Primary school is a medium size rural school in the region of Rethymno, comprising 29 teachers and 155 students, with students of foreign nationality amounting to 35%. Plakias primary school can be characterized as a really innovative school, having its own highly equipped Robotics Lab and a strong presence in winning awards in Robotics Competitions.

A total of 4 **teachers** (2 teachers and 2 expert teachers) and 19 **students** were engaged in the piloting implementation. The majority of students (53%) were girls (10 out of 19), while those attending 5th and 6th grade respectively, were equal in number. There were quite a few students of immigrant background and also two students in the pilot group with severe special abilities, who were reported to have been highly motivated and actively involved.

All students have successfully completed the project and were awarded two badges each. In fact, as it was reported by the teachers, emphasis was intentionally placed on the acquisition of robotics skills and not much on the badges, as the particular students were primarily and genuinely motivated by the Robotics classes per se rather than the badges that accompanied each module.

Nea Anatoli Primary school is a small multicultural rural school, situated in a sparsely-populated area in the region of Lasithi, consisting of 18 teachers and 81 students, with students of foreign background constituting the greatest part of the student population. Acceptance of diversity is dominant in the school and piloting of CODESKILLS4ROBOTICS Tool Kit has presented a good opportunity for inclusiveness, as diversity of students in terms of ethnic background was the characteristic of the piloting students' group, in which there was also a student with learning difficulties.

A total number of 9 **students**, all being sixth graders and 3 **teachers** (2 teachers and 1 expert) were actively involved in the piloting implementation. The vast majority of students (67%) were boys (6 out of 9), while 33% of them were girls. All students were successful in the piloting testing and were awarded **3** badges each, 2 for Module 1 and 1 for the History Scenario.

Tavronitis Primary school is also a medium size rural school, situated in the region of Chania, with a total of 23 teachers and 114 students, with students of foreign nationality and of immigrant background being part of the school population. A total number of 8 **students** and 1 **teacher** took part in the piloting implementation. The vast majority of students 63 % were boys (5 out of 8), while all the students were in 5th grade. There were some students of special abilities and many students of multicultural background that participated in the piloting group. They all completed with success the piloting and were awarded **2** badges each for Module 1 which was taught.

19th Heraklio Primary school is a large urban school in the center of Heraklio, with a total number of 38 teachers and 260 students, with very few students of foreign background. The school also has a Robotics lab and a background of award winning in school Robotics Competitions. A total of 15 **students** and 2 **teachers** (one teacher and one expert) participated in the piloting group, which also consisted

of 3 students with special needs and abilities. The great majority of students (60%) were girls (9 out of 15), while all of them belonged to the sixth grade. All students have been successful in the piloting testing and were awarded **3** badges each, for Module 1 and for the History Scenario.

Overall, CODESKILLSROBOTICS Tool Kit **piloting has been met with great success by all students** and in all piloting schools, a total of **126 open badges** (two for Module 1 and 1 for the scenarios taught) were awarded to the students. Interestingly enough, obtaining the badges seemed to have acted as a supplementary strong motive for their engagement, as students were said to have been eager to acquire the new skills, being intrinsically motivated primarily by robotics classes per se. This can be said to be the added value of the implementation process in RDPSEC schools, as it has managed to instill inner motives, which are known to be the strongest ones.

National Center for Scientific Research 'Demokritos'

Both the 3rd and 11th Primary schools of **Marousi** participated in the pilot testing phase on behalf of Demokritos. Marousi is a municipality near Athens, so these are schools that are located in an urban environment. There are 195 students and 30 teachers in the 3rd primary school, while 11th primary school has a total of 183 students and 25 teachers. A total of 2 **teachers** (1 expert and 1 school teacher) and 12 **students** participated in the pilot implementation.

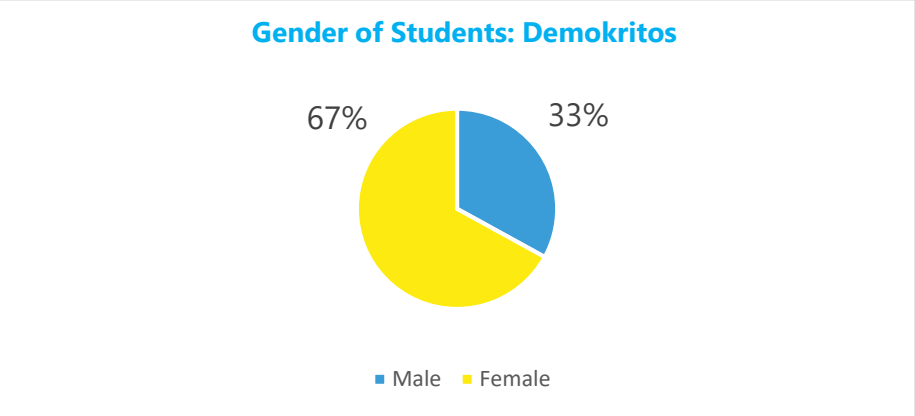


Figure.5 Students Gender of Demokritos Schools

As shown in figure 5, the **greatest majority** of the students (67%) were **girls** (8 out of 12), which can be said to be a highly positive aspect of the piloting implementation in Demokritos schools and its contribution to the project intentions to generate new prospects for enhancing coding skills in female student population. The vast majority of children (11 out of 12) were pupils in the fifth grade, while only one of them was in the sixth grade. Two of the children who participated were children with diagnosed learning disabilities, while one of the children was a child with an immigrant background.

All the children have completed the pilot application successfully. Due to the fact that only a part of the educational material was taught, the pupils were only awarded with the relevant digital Open Badges. Each child was awarded with the three digital Open Badges of Module 1 (Basic, Intermediate and Advanced) and one for the implementation of the Culture scenario, which were the parts of the material that were actually taught. A total of **48** digital badges were awarded to students in the pilot application on behalf of Demokritos.

Hellenic Mediterranean University

The Hellenic Mediterranean University participated in the piloting implementation with 12th Heraklion Primary school, which is a large urban school in the city of Heraklion Crete and has a total number of 32 teachers and 184 students. The school has an Educational Robotics and Computer Lab and has also won prizes in school Robotics Competitions in 2018 and 2019.

Totally, 2 **teachers** (1 teacher and an ICT teacher expert) and 18 students participated in the pilot testing, almost all of whom belonged to the sixth grade. As it can be seen in figure 6., the **majority** of the students were girls (10 out of 18). This is a very positive result which supports the project's purpose to engage more girls in Robotics education.

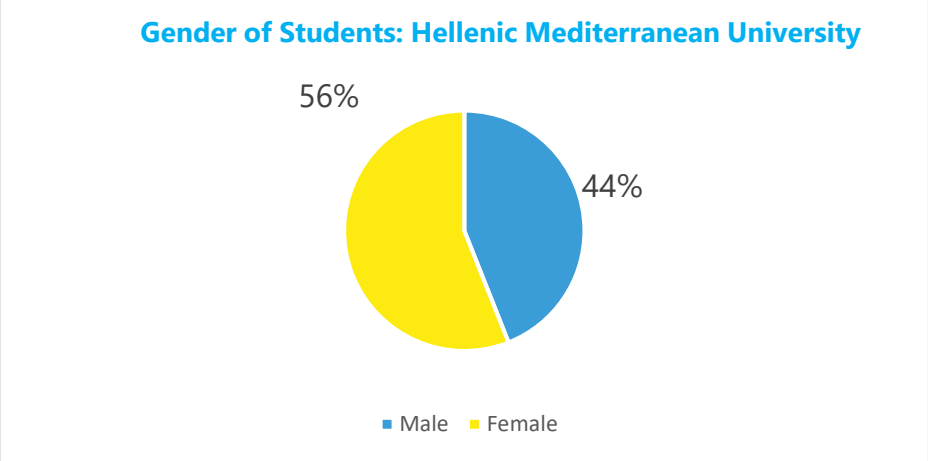


Figure.6 Students Gender of HMU Schools

All students **have successfully completed** the piloting testing and a total of **30** badges was given by the teachers.

Cyprus

Emphasys Center

Emphasys Centre as an educational and training centre offered the courses in its premises. The students were registered to the courses through various dissemination activities which Emphasys Centre organised. These included a visit to the 40th Scout Troop in Engomi, a visit to Agios Demetrios Primary school in Strovolos, as part of the Christmas activities organized by the parent's association, as well as the Cyprus International Education Expo, where Emphasys Centre has participated the for the last 5 years.

A total of 4 **teachers** (2 experts with Computer Science background and 2 assistant teachers, one with Computer Science background and the other with Architecture and Civil engineering background) and 27 **students** participated in the pilot implementation of the project.

The students participating were mostly from urban areas (93%) and only two (7%) of our students were from rural areas, the furthest being a 50 min drive. As shown in figure 7., the participating boys represented 89% (24) of the pupils and girls 11% (3).

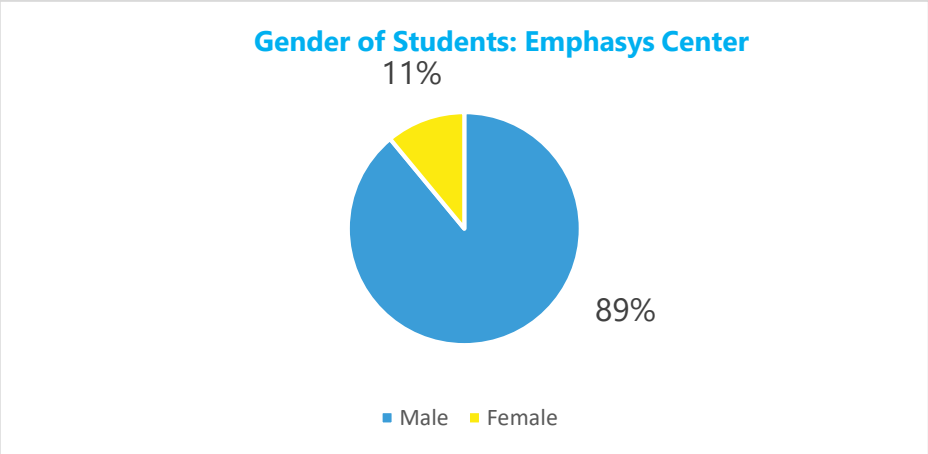


Figure.7 Students Gender of Emphasys Center

Additionally, 70% (19) of the students were at the age group of 10-12 years old and 30% (8) were at the age group of 8-9. Five of the students participating were

the children of immigrants from Syria. Two of the children, as informed by their parents, were students with learning difficulties. Four of the children had difficulties understanding Greek so in certain cases the teacher would explain also in English and in other cases the assistant teacher was next to the students translating the instructions of the teacher.

Due to the pandemic situation and the closure of all education centres and schools in Cyprus the courses were unfortunately abruptly interrupted and the classes continued online. The students had completed up to that time Module 1 and also the Space scenario from Module 2. Thus, they were awarded with the three badges which involved the material from Module 1 and the badge for the completion of the above-mentioned scenario resulting in a total of **108** badges, which Emphasys Centre has awarded to its students for their **successful implementation of this pilot testing.**

Sweden

Halsingland Education Association

Halsingland Education Association piloting school, namely, Stentägtskolan is located in the municipality of Söderhamn, which has approximately 26,000 inhabitants. The city of Söderhamn has approximately 13,000 inhabitants and Stentägtskolan is located in the northern part of the city. The area consists mostly of residential buildings and can be characterized as an area that is popular with families with children. The school has existed since 1960, but has been renovated and expanded in 2018. Stentägtskolan has about 280 students and the staff amounts to about 50 teachers, leisure educators and kitchen staff. Students originating from other countries are represented, but the majority of students have Swedish as their mother tongue. The **students** involved in pilot activities were 8. Most students go to fourth or fifth grade. As figure 8. indicates, the majority of students were boys.

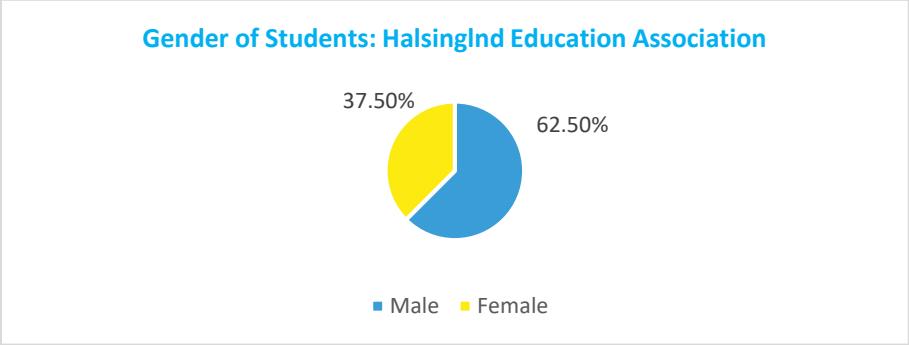


Figure.8 Students Gender of Halsingland Education School

3 **teachers** have participated in the piloting implementation, as Jonas Andersson, Marie Edling are active in the project and from KomTek Ylva Bjelksäter was involved as a technical expert, but also in the role of teacher. Andersson teaches Mathematics, Physics, Technology. Ylva Bjelksäter teaches Mathematics, Physics and she is heading KomTek. Marie Edling teaches English, Physical Education and Health. Furthermore, four new teachers will start working with the CODESKILLS4ROBOTICS programme.

Overall, piloting implementation has been successful for all students and a total number of **16 badges** have been awarded to the piloting group of students. Besides the first piloting group, a new group starts its piloting on April 14, a prospect that enhances the sustainability of the project in Swedish schools.

Piloting Methodology

On the basis of the external dominant conditions and the contextual ones in operation in each partner organization, the piloting implementation adopted diverse forms and the participating students were offered blended learning opportunities (F2F and online learning activities). The methodology adopted, along with the specific relevant information per each partner are analytically presented below:

Greece

Regional Directorate of Primary and Secondary Education of Crete

The piloting testing in the four RDPSEC schools took place in various forms in accordance with the specific school context and the pandemic conditions in effect. In the three schools, i.e. **Plakias**, **Nea Anatoli** and **19th Heraklio** Primary school the piloting was held **within the school time**, during **morning school zone**, for 2 hours per week. When it comes to Tavronitis primary school it took place **after school time** during the **extended zone** (all day), for 1.5 hours per week accordingly.

Having started piloting relatively early, on 18 December 2021 on a preparatory stage and given that the pandemic situation in Crete allowed for schools to remain open until the official ending of RDPSEC piloting, i.e. the first week of March 2021, in the four piloting schools, **pilot testing classes were held fully in the physical presence of students**. Hence, a total number of approximately **80** hours of robotics classes **were held face to face**. Since no need for distance teaching was imposed due to the pandemic, an enterprise that would have been more difficult, students were able to avail to the maximum of the opportunities generated by their direct access and programming in real time their Lego Boost robots with their classmates, which can be said to be a strong aspect of the piloting methodological approach adopted, being instrumental in the overall **successful piloting implementation** for RDPSEC schools and for enhancing student motivation.

Nonetheless, prior to commencing with the face to face implementation of piloting all teachers had spent some hours online familiarizing all students with the online platform. This allowed students to be offered later in parallel with the

f2f robotics pilot classes **blended learning opportunities** and become engaged in self-studying by making full use of the e-learning platform material at their own pace and according to their needs, always under teacher support.

Besides, the e-platform is structured in such a way so that it serves the purpose of online self-involvement that would help them augment further the robotics skills acquired in their actual classes. However, it is not feasible to note down the exact number of hours of online learning engagement, as each student followed his/her own time schedule.

National Center for Scientific Research 'Demokritos'

The pilot testing took place directly **after school hours** (**extended zone**/ oloimero) for 1,5 to 2 hours per day on a 3 to 4 days per week basis. The original idea was that, since both (**3rd and 11th** primary schools of Marousi) schools are located in the same building, one CODESKILLS4ROBOTICS CLUB could be created with the participation of ten to fifteen children from both schools. However, the Participants' Committee decided that for safety reasons, caused by Covid-19 pandemic, the students should be divided into two separate smaller groups of five to seven children each. Finally, twelve children took part in the pilot testing phase and formed two groups of six.

During the pilot implementation a **blended learning approach** was followed. Of course, this was the plan from the beginning, but the fact that primary schools closed from 11/2 to 30/03/2021, led to distance learning and the use of the online platform became central to this process. In total, for each group 7,5 hours were **held in-class,** while 32 hours of training took place **online**.

In the distance learning phase, technical support was provided so that the teaching process became as interactive as possible. The teacher had the appropriate equipment at his disposal so that the students could see in real time the programming process and the subsequent actions of the robot. This procedure was necessary, since the process of learning by doing is central to educational robotics and the fact that students did not have a Lego Boost kit at home made this process very difficult. However, the ability of the students to program the robot in real time and immediately see on their screen live what the robot does, made the lesson much more interesting and interactive for the students. It is worth noting that during the distance learning phase the two groups of children were united, since the children no longer had to form smaller groups.

Overall, given the circumstances, the experience of **the pilot implementation** of the project by Demokritos is considered **successful**. The fact that the educational material was designed in a way that favored blended learning made the transition to distance learning very easy, of course with some necessary adjustments.

Hellenic Mediterranean University

The piloting testing in the **12th Heraklion Primary School** was held during the **morning school zone** every Wednesday and Thursday, for a total of 2 hours per week. Since the pandemic conditions in Crete were positive for the school to continue to be open for all the period that Hellenic Mediterranean University piloting lasted the pilot testing classes were conducted **face to face** by two teachers and the 18 students were offered a total number of at least 24 hours of F2F teaching and online learning activities

Cyprus

Emphasys Center

The piloting implementation took place at Emphasys centre during the afternoon hours, **outside the school hours**. The sessions took place mainly **face** to **face** (Lessons started the 2nd week of September to December 2020) and completed **online** due to the second wave of pandemic.

Sweden

Halsingland Education Association

For Halsingland Education Association piloting school, the piloting implementation took place for 2 hours on Wednesdays **after school**. The sessions were entirely conducted **F2F**. Opportunities have always been available to supplement information for participating students and responsible teachers via text message, email or via Team Meeting.

Piloting Implementation Schedule

The piloting implementation schedule regarding each partner organization in terms of time period, dates and hours of session is outlined below. Additionally, reference is made to any difficulties encountered in terms of time constraints and any modifications made.

Greece

Regional Directorate of Primary and Secondary Education of Crete

Piloting Implementation for RDPSEC Schools, commenced on a preparatory stage on 18 December 2021 and was completed on 8th March 2021. Besides some online preparatory and familiarisation sessions, all four piloting schools had a two-hour session on a weekly basis, which in total amounted to approximately **80 F2F** teaching hours. In parallel, students were offered **blended learning**, being engaged in several online self-studying sessions on the platform and in communication with their teacher by means of the platform tools, the total number of which cannot be precisely determined, as each student followed his/her own pace. Apart from piloting sessions, a few hours of online sessions after the piloting for student preparation for the C2 Training activity were held. More specifically, the exact timetables for each school are provided below:

Plakias Primary School

Starting date: **18/12/2021** | End date: **04/03/2021**

Date	Duration	Timetable	Location
18-12-2020	2 teaching hours	4th & 5th hour	Online
20-01-2021	2 teaching hours	5th & 6th hour	In class
21-01-2021	2 teaching hours	4th & 5th hour	In class
27-01-2021	2 teaching hours	5th & 6th hour	In class
28-01-2021	2 teaching hours	4th & 5th hour	In class
03-02-2021	2 teaching hours	5th & 6th hour	In class
04-02-2021	2 teaching hours	4th & 5th hour	In class
10-02-2021	2 teaching hours	5th & 6th hour	In class
11-02-2021	2 teaching hours	4th & 5th hour	In class
17-02-2021	2 teaching hours	5th & 6th hour	In class
18-02-2021	2 teaching hours	4th & 5th hour	In class
24-02-2021	2 teaching hours	5th & 6th hour	In class
25-02-2021	2 teaching hours	4th & 5th hour	In class
03-03-2021	2 teaching hours	5th & 6th hour	In class
04-03-2021	2 teaching hours	4th & 5th hour	In class

A total of approximately **30 F2F** hours coupled with **several hours** of students **online self-studying** sessions.

19th Heraklio Primary School

Starting date: **18/12/2021** | End date: **04/03/2021**

Date	Duration	Timetable	Location
22-12-2020	1 teaching hour	6th hour	online
12-01-2021	1 teaching hour	6th hour	In class
14-01-2021	1 teaching hour	6th hour	In class
19-01-2021	1 teaching hour	6th hour	In class
21-02-2021	1 teaching hour	6th hour	In class
26-02-2021	1 teaching hour	6th hour	In class
28-02-2021	1 teaching hour	6th hour	In class
02-02-2021	1 teaching hour	6th hour	In class
24-02-2021	1 teaching hour	6th hour	In class
09-03-2021	1 teaching hour	6th hour	In class
11-02-2021	1 teaching hour	6th hour	In class
18-02-2021	1 teaching hour	6th hour	In class
23-02-2021	1 teaching hour	6th hour	In class
25-02-2021	1 teaching hour	6th hour	In class
02-03-2021	1 teaching hour	6th hour	In class
04-03-2021	1 teaching hour	6th hour	In class

A total of approximately **18 F2F** hour sessions coupled with an equal number of students online self-studying blended learning sessions.

Nea Anatoli Primary School

Starting date: **18/12/2021** | End date: **04/03/2021**

Date	Duration	Timetable	Location
18-12-2020	2 teaching hours	1st &2nd hour	online
14-01-2021	2 teaching hours	1st &2nd hour	In class
21-01-2021	2 teaching hours	1st &2nd hour	In class
28-01-2021	2 teaching hours	1st &2nd hour	In class
04-02-2021	2 teaching hours	1st &2nd hour	In class
11-02-2021	2 teaching hours	1st &2nd hour	In class
19-02-2021	2 teaching hours	1st &2nd hour	In class
25-02-2021	2 teaching hours	1st &2nd hour	In class
04-03-2021	2 teaching hours	1st &2nd hour	In class

A Total of approximately **18 F2F** hour sessions coupled with **several hours** of students online **self-studying blended learning** sessions.

Tavronitis Primary School

Starting date: **18/12/2021** | End date: **08/03/2021**

Date	Duration	Timetable	Where
21-12-2020	1.5 teaching hours	13.30-15.00	Online
11-01-2021	1.5 teaching hours	13.30-15.00	In class
25-01-2021	1.5. teaching hours	13.30-15.00	In class
01-02-2021	1.5 teaching hours	13.30-15.00	In class
08-02-2021	1.5 teaching hours	13.30-15.00	In class
15-02-2021	1.5 teaching hours	13.30-15.00	In class
22-02-2021	1.5 teaching hours	13.30-15.00	In class
01-03-2021	1.5 teaching hours	13.30-15.00	In class
08-03-2021	1.5 teaching hours	13.30-15.00	In class

A Total of approximately **14 F2F** hour sessions coupled with an **equal number** of students' **blended learning sessions** of online self-studying.

Regarding time difficulties encountered, they mostly generated either due to the pressing pandemic conditions for teachers or the uncertainty of potential lockdowns enforced. As no more than two hours per week could be devoted, the greatest challenge faced was in terms of time to be found for schools to implement the pilot during the morning zone in parallel with the school curriculum hours. Hence, to resolve this practical difficulty, it was chosen for the schools to start piloting the soonest possible so as to extend the time period of piloting in terms of weeks.

Pertinently, it is worth mentioning that it had been decided, right from the very beginning of the digital strategy planning, that all schools would keep on implementing the robotics classes piloting beyond the formal pilot period until the end of the school year, as the goal of the schools was for the students to reap the benefits of the program to the maximum. This would also allow teachers to devote more time to the basic robotics concepts and make sure that all students acquire the basic robotics skills, since, as already mentioned, the majority of them had no knowledge of robotics and they needed time to assimilate the new skills.

Thus, on the first week of March, which coincided with the official ending of RDPSEC piloting, the lockdown enforced led to the closure of schools in one region, while the three other schools remained open. This has allowed them to continue some of the CODESKILLS4ROBOTICS classes, despite the official ending of piloting, as both teachers and students were highly motivated to do

so until the general lockdown was enforced. CODESKILLS4ROBOTICS classes will resume though, when permitted by the pandemic upon the opening of schools. This can be said to be the added value of RDPSEC implementation as, in addition to allowing students to fully exploit the educational material offered by the project, it presents at the same time a valuable actual opportunity for project sustainability and further exploitation in Greece.

National Center for Scientific Research 'Demokritos'

Starting date: **3/2/2021** | End date: **30/03/2021**

Date	Duration	Timetable	Where
03-02-2021	1,5 teaching hour per group	14:00 – 16:00	In class
04-02-2021	1,5 teaching hour per group	14:00 – 16:00	In class
05-02-2021	1,5 teaching hour per group	14:00 – 16:00	In class
09-02-2021	1,5 teaching hour per group	14:00 – 16:00	In class
10-02-2021	1,5 teaching hour per group	14:00 – 16:00	In class
16-02-2021	2 teaching hours with all children	18:00 – 19:30	online
17-02-2021	2 teaching hours with all children	12:00 – 13:30	Online
18-02-2021	2 teaching hours with all children	12:00 – 13:30	Online
19-02-2021	2 teaching hours with all children	12:00 – 13:30	Online
23-02-2021	2 teaching hours with all children	10:00 – 11:30	Online
24-02-2021	2 teaching hours with all children	12:00 – 13:30	Online
25-02-2021	2 teaching hours with all children	12:00 – 13:30	Online
26-02-2021	2 teaching hours with all children	12:00 – 13:30	Online
02-03-2021	2 teaching hours with all children	10:00 – 11:30	Online
03-03-2021	2 teaching hours with all children	12:00 – 13:30	Online
04-03-2021	2 teaching hours with all children	12:00 – 13:30	Online
05-03-2021	2 teaching hours with all children	12:00 – 13:30	Online
09-03-2021	2 teaching hours with all children	10:00 – 11:30	Online
10-03-2021	2 teaching hours with all children	12:00 – 13:30	Online
11-03-2021	2 teaching hours with all children	12:00 – 13:30	Online
12-03-2021	2 teaching hours with all children	12:00 – 13:30	Online
30-03-2021	2 teaching hours with all children	10:00 – 11:30	Online

A total of approximately **42 teaching hours** were held, coupled with **several** hours of students' **self-engagement** in the e-platform.

It should be noted that there were difficulties in terms of the time schedule after the enforcement of the lockdown, which meant the closing of primary schools in the Athens area. With students having to attend their school lessons in the afternoon (14:00-17:15), the pilot training schedule was forced to shift to earlier in the day. After a meeting of the Participants Committee, it was mutually decided to hold the lessons between 12:00-13:30 on Wednesdays, Thursdays and Fridays and at 10:00-11:30 on Tuesdays in order to cover the needs of the pupils and their parents.

As mentioned before, (please refer to section of 5.2a), the students had no prior experience in educational robotics and coding. As a result, it was difficult to keep the original planning for the implementation of module 1. Finally, it was chosen to dedicate more time to Section A, in order to give more time to the students so that they become more familiar with both the user interface of Lego Boost kit and the programming environment. Additionally, due to the fact that the training was moved from in-class to online because of the lockdown it was decided to increase the number of hours by 10 in order to cover the initially planned Syllabus. In other words, 42 hours of teaching took place instead of the initially planned 30.

Hellenic Mediterranean University

12th Heraklion Primary School

Starting date: **13/1/2021** | End date: **25/02/2021**

Date	Duration	Timetable	Where
13/01/2021	1 teaching hour	11.45-12.25	In class
14/01/2021	1 teaching hour	10:00-10:45	In class
20/01/2021	1 teaching hour	11.45-12.25	In class
21/01/2021	1 teaching hour	10:00-10:45	In class
27/01 /2021	1 teaching hour	11.45-12.25	In class
28/01/2021	1 teaching hour	10:00-10:45	In class
03/02/2021	1 teaching hour	11.45-12.25	In class
04/02/2021	1 teaching hour	10:00-10:45	In class
10/02/2021	1 teaching hour	11.45-12.25	In class
11/02/2021	1 teaching hour	10:00-10:45	In class
24/02/2021	1 teaching hour	11.45-12.25	In class
25/02/2021	1 teaching hour	10:00-10:45	In class

A total of **12 hours** for each class and also approximately each student performed online another **12 hours** in the online platform.

As far as time difficulties are concerned, the main problem was that from the beginning of the pilot testing many of the students did not have an email account in order to sign in to the platform. This resulted in a slight delay in the teaching of the Toolkit for the first week of the pilot training. Also due to the measures to limit the Covid 19 pandemic, enough time was devoted before each session for the meticulous disinfection of both the classroom and the equipment used for the construction of the small robots used in module 1 and module 2.

Cyprus

Emphasys Center

Starting date: **07/9/2020 |** End date**: 05/3/2021**

The students were divided into five different groups and attended a weekly session of 2 hours each. There were for each class approximately 14-15 meetings and the total teaching time was around 142 hours with 28-30 hours dedicated per group. A series of online sessions have been organised to prepare the students for the C2 activity.

Date	Group	Duration	Timetable	Location
07-09-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
09-09-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
10-09-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
14-09-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
16-09-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
17-09-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
21-09-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
23-09-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
24-09-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
28-09-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
30-09-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
05-10-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
07-10-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
08-10-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
12-10-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
14-10-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
15-10-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
19-10-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
21-10-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
22-10-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
26-10-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
29-10-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
02-11-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
04-11-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
05-11-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
09-11-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
11-11-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
12-11-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
16-11-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
18-11-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
19-11-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
23-11-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
25-11-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
26-11-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
30-11-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
02-12-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
03-12-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
07-12-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
09-12-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
10-12-2020	4 & 5	2 Hour Session per Group	15:30-19:30	Emphasys Lab
14-12-2020	1	2 Hour Session	17:00-19:00	Emphasys Lab
16-12-2020	2 & 3	2 Hour Session per Group	15:30-19:30	Emphasys Lab
17-12-2020	4 & 5	2 Hour Session per Group	15:30-17:30	Emphasys Lab
29-01-2021	MIX 4 STUDENTS	2 Hour Session	17:30-19:30	Online
12-02-2021	MIX 4 STUDENTS	2 Hour Session	17:30-19:30	Online
26-02-2021	MIX 4 STUDENTS	2 Hour Session	17:30-19:30	Online
05-03-2021	MIX 4 STUDENTS	2 Hour Session	17:30-19:30	Online

Time difficulties had to do with cases where students did not have prior or little experience concerning Lego blocks (i.e., connecting and separating blocks). Therefore, the first two classes were devoted in getting familiarized with the Lego Boost Kit. Students constructed tall buildings which could carry a Ping-Pong ball and various contraptions which were aiming at stimulating their imagination and interest, after each task was completed each of the students explained his/her build to the rest of the classroom. Another robot (Edison), was also introduced in the first course serving as a less complex introduction to the Lego Boost kit. It had simple barcode commands, which were printed and the students could easily program their robots to do tasks such as avoiding obstacles, following a torch, sumo wrestling and following a black line.

Sweden

Halsingland Education Association

Stentägtskolan Primary School

Starting date: **10/2/2021** | End date:**17/3/2021**.

Date	Duration	Timetable	Where
03-02-2021	Two teaching hours	14-16	In class
10-02-2021	Two teaching hours	14-16	In class
17-02-2021	Two teaching hours	14-16	In class
24-02-2021	Two teaching hours	14-16	In class
03-03-2021	Two teaching hours	14-16	In class
10-03-2021	Sports holiday	-	-

A total of **10 hours** face to face sessions for 5 weeks, Wednesday afternoons supplemented by an **equal number of blended learning** of students in the e-platform.

For Sweden, the greatest challenge with the pilot activities was how students would at the same time manage to fulfil their schooling in parallel with the work in the project. After the teachers came to the conclusion that Wednesday afternoons after school end is the optimal solution for our students, the work with the pilot activities has worked very well. As mentioned earlier, it was decided that the students would be divided into two piloting groups due to the limited number of students allowed in the Komtech Science Lab, for safety reasons. Hence, the second piloting group starts Tool Kit implementation on 14 April 2021, acting as part of the project sustainability plan in Sweden as well.

Piloting Content/Portfolios of Work

The content of the Piloting implementation along with the accompanying portfolios of work, illustrating the descriptions for each partner is the focus of the following sections.

Regional Directorate of Primary and Secondary Education of Crete

Upon beginning, it should be underlined that for RDPSEC schools the lack or existence of previous knowledge of students and familiarization with robotics or not was the basic factor that accounts for the teaching content that was eventually taught in accordance with the initial digital strategy that had been planned by each school and the manifested differences between schools in terms of the pace of teaching followed.

That said, it appears that in all piloting schools the initial sessions were devoted to help students familiarize with the e-learning platform so as to be able to engage in parallel with f2f teaching during piloting in self-studying sessions as blended learning requires. After the familiarization sessions, they proceeded with their enrollment on the platform, developing the students' digital profiles, and became acquainted with the online tools and the courses available. This familiarization with the platform allowed students to study later online on their own the modules they had been taught in order to further practice and assimilate better the new knowledge at their own pace.

In the following session by means of visual material (photos, videos) the teachers attempted to lead in the teaching content by engaging students in brainstorming, regarding the applications of robotics in their everyday life. This aimed at arousing students' interest and bringing background knowledge to the service of the new skills to be taught.

Then students became familiar with the Lego Boost Kit as a programming tool. In the following sessions, they were introduced to section A of Module 1

meeting robot Rea, which they constructed in groups following the teacher's instructions and then logged in the CODESKILLS4ROBOTICS learning platform to complete the first exercises sets. In the following lessons, they gradually covered the basics of the whole Module 1 material, learning how to program REA, by focusing initially on basic movements and more complex ones in the future, becoming familiar with the diverse uses of the sensors, using gears to speed up and slow down REA etc. Generally, all teachers placed particular emphasis on helping **all students** acquire the **basic coding skills**, allowing the necessary time according to students' needs. In fact, in Tavronitis primary schools, as students faced some additional difficulties due to complete lack of previous robotics skills, it was decided that more hours were needed to be devoted compared to the initial planning.

Besides the successful completion by all schools of the prerequisite **Module 1**, all schools except Tavronitis, proceeded with **one or two** of the four teaching scenarios available in **Module 2** on the basis of the pupils' interests. Plakias Primary school, focusing on current world affairs in effect the period of piloting related to NASA launching to Mars a robotic vehicle 'Persi', opted to teach **Space scenario** to show students the direct application of robotics into real life, which resulted in strong enthusiasm on their part.

Nea Anatoli Primary school teachers, on the other hand, picked the **History scenario** of the Cretan robot Talos and students were involved in cross-curricular activities, making the Cretan map and measuring the altitude of Crete and the construction of Vernie the robot.

Finally, 19th Heraklio Primary school teachers have chosen to employ both **the History scenario**, focusing on European countries and the **Space scenario**, in their attempt to make the most of the opportunities for cross-curricular teaching activities that the scenarios offer. In fact, in 19th Heraklio Primary School, having as a basis the History Scenario, they moved a step further by creating their own projects, developing a route on European Map, where the robot was programmed to stop in several countries, announcing a voice message giving information on the most important monuments of each European country, which has increased student motivation, as they realized in practice the benefits of programming, by creating their own products.

Overall, despite the diversities in terms of content choices, the common feature underlying all robotics classes were the **smiley eyes** and **eagerness** of the students along with the **highly cooperative stance** exhibited, deriving much pleasure cooperating with their peers and the robots, as it can be seen in the following photos.

RDPSEC Cretan students CODESKILLS4ROBOTIC Piloting Moments

Plakias Primary School students programming Rea and Applying Space Scenario

Nea Anatoli Primary School Students employing History scenario and Rea Construction

RDPSEC Cretan students CODESKILLS4ROBOTIC Piloting Moments

19th Heraklio School students programming Rea and applying History Scenario

Tavronitis Primary School students programming Rea

National Center for Scientific Research 'Demokritos'

Demokritos started the pilot implementation with an introductory lesson in order for the students to familiarize themselves with the e-learning platform. The students signed up to the platform, supplemented their digital profiles with information regarding their interests, rolled up to the available courses and became familiar with the communication tools provided. This introductory course was deemed necessary since the familiarization of students with the use of the platform would be necessary in the implementation of the blended learning approach. Students attended the course which was delivered in the classroom (either in person either online), but had access to this material also at home. They could re-read what they were taught in the classroom so that they had the opportunity to consolidate it better. If they had any questions, they posted it to the communication tools in order to be answered either by a classmate or by their teacher.

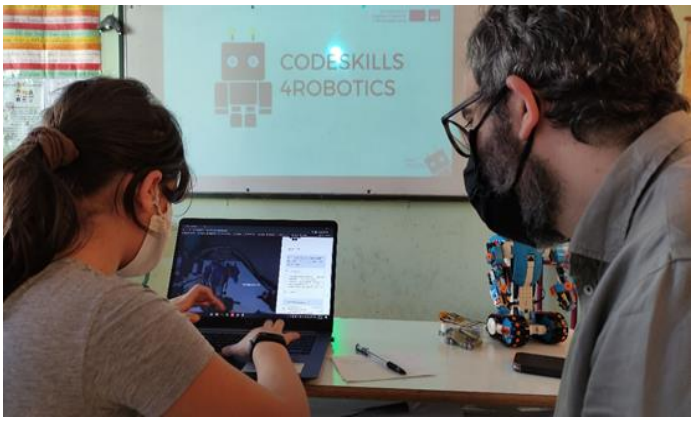
In the second lesson the children became familiar with the use of the programming environment of the Lego Boost kit. The Culture Creative Scenario was used in this process. This particular scenario, due to its appealing construction (guitar) and also due to the fact that the students can use the guitar in an easy and playful way and immediately produce a number of sounds made it ideal for this process. This idea, namely the fact that we have modified the structure of the educational material and first implemented the **Creative Culture** educational scenario of **Module 2** proved to be very effective. The students were impressed and looked forward to the next lessons.

After those two lessons, and in particular in the third lesson, students were introduced to Module 1 section A and met our robot REA. They successfully constructed the robot with the given instructions. After that the original structure of Module 1 was followed with some adjustments regarding the time devoted to each section. As mentioned before, due to the lack of experience of students in educational robotics and programming the time spent on section A was greater than the original planning. Finally, students successfully completed the entire **Module 1** by the end of the pilot implementation.

Some students piloting moments are illustrated below:

Athens Demokritos students CODESKILLS4ROBOTIC Piloting Moments

The Guitar and the Culture Creative Scenario



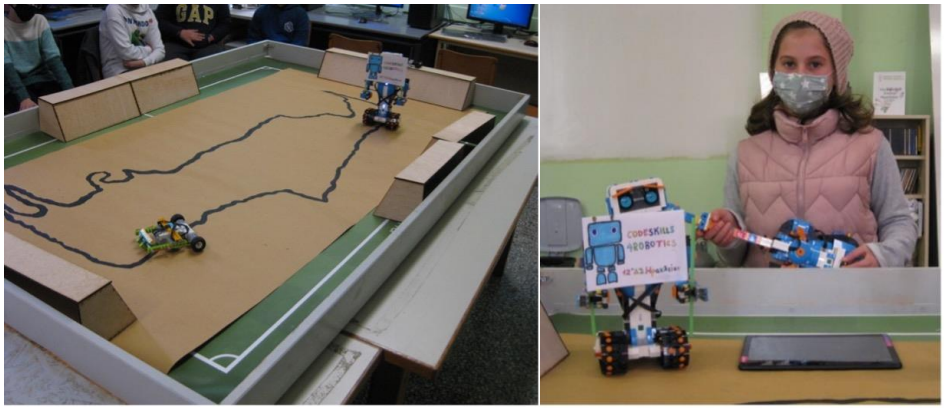
Students Familiarizing with the e-platform

Demokritos Students Constructing Rea

Hellenic Mediterranean University

Hellenic Mediterranean University started the pilot implementation with an introductory lesson about the e-learning platform. This introductory course was considered necessary by the teachers for the implementation of the blended learning approach. Students attended the course which was delivered in the classroom, but had access to this material also at home. The lessons included, among others, topics like construction of the robotic vehicle REA, dealing with the Lego Boost software, the various color and sound sensors, etc. Moreover, several applications were implemented by the students concerning the path following problem in robots and the creative scenarios, as described in the educational material. The students were impressed and successfully completed the entire **Modules 1** and **2** by the end of the pilot implementation. The students with great enthusiasm and joy implemented the **History** and the **Culture** scenario of **Module 2**, as shown in the following pictures.

HMU Cretan students CODESKILLS4ROBOTIC Piloting Moments



12th Heraklio Primary School students drawing from CODESKILLS4ROBOTICS Classes

Emphasys Center

On behalf of Emphasys Center special care was given during the first three introductory courses as to attract student's attention and to lay solid foundations for the lessons to follow. Upon entering the classroom, the students were greeted by Vernie, the mascot robot of the Lego Boost kit and saw different movements and maneuvers which the robot performed. The teacher gave the rules of the classroom and made sure all children understood them and agreed upon them. The class Dojo platform was also used for attendance and behavior management of the classroom. The students were also given their own Lego mini figure, which would accompany them in all their robotic builds.

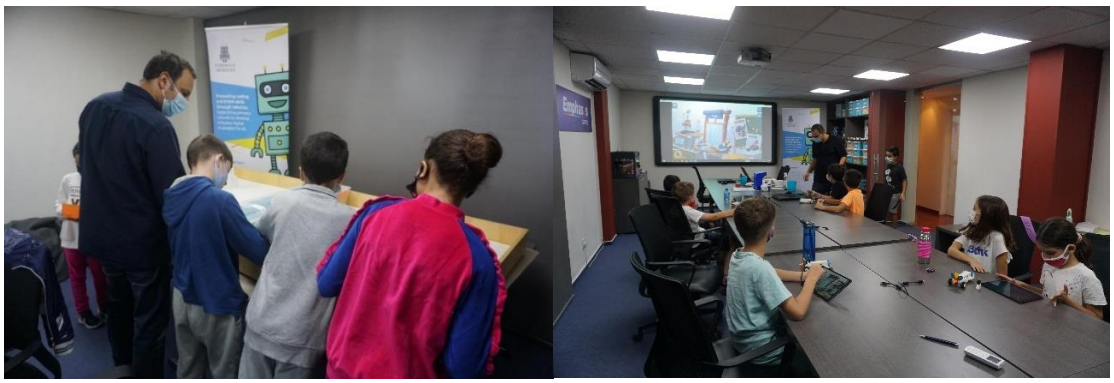
As an introduction to robotics another robot (Edison) was presented in order to familiarize the students with the concepts of robotics. Due to the simplicity of the abovementioned robot, it served as an ideal introduction to the course. The students with the help of barcodes which the robot reads could pass on specific programs such as avoiding obstacles, following a torch, sumo wrestling and following a black line which the students created tracks with black markers.

On the third lesson, the students with the help of the teacher and assistant teacher registered to the project's platform. The younger students, as it was noticed, lacked basic web browsing skills and were more comfortable continuing the process with the use of tablets instead of laptop computers. A familiarization exercise which was used involved the building of a tall contraption with the winner being the student who had the tallest standing built.

The fourth meeting involved the building of the main robot of Module 1 (REA) and the completion of the first set of exercises. The students were instructed to login in the Codeskills4robotics learning platform and download the directions for building REA as well as the chapter's exercises. The fifth up to eleventh lesson covered the rest of the material of **Module 1** including the various uses of the accompanied sensor, using gears to speed up and slow down REA as well as remote controlling REA and advanced coding with loops and variables. Additional exercises were used to enrich the material such as precise movement to reach a

specific location and creating catapults to throw down a tower made out of plastic cups. In the last 4-5 lessons the **Space Scenario** from Module **2** was implemented. Two lessons were needed for the full build of the MTR-4 Robot, which was used for the scenario and the last two for the setup of the track and the exercises and tasks which the students had to complete.

Cypriot Emphasys Center students CODESKILLS4ROBOTIC Piloting Moments



Constructing and Programming Rea

Emphasys students with their robots

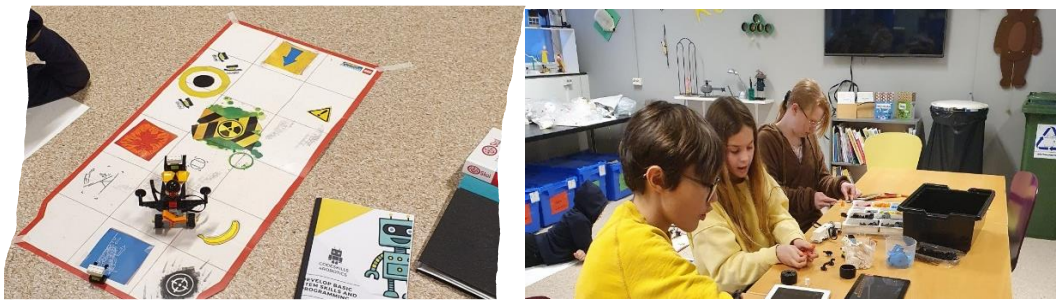
Sweden

Halsingland Education Association

HEA has completed the first piloting groups' activities program. During the first session the teacher had a short introduction describing the content of the platform and had written out a tutorial for the students. During the next session the teacher went through the programming environment and they got started building REA. They had no problem building according to the instructions and found no problems to program it. The group had a previous experience of building lego and how to follow instructions. What was new was learning how to code the robots. Hence, the students built the robot REA and were trained to code it. Some students proceeded with the construction of Vernie as well. Due to aspect of time the students concentrated on **module 1**, applying also the **Space Scenario** from module 2, measuring the distances between the planets. The experience from the first group is that they were able to retrieve data from the E-platform. The students have worked 2 and 2.

As earlier mentioned, another group starts piloting on April 14 2021, and in this case the teacher expert, Ylva Bjelksäter, will let the students in that group try to work more independently with their own set of Lego Boost. The purpose is to be able to make a comparison of which method engaged the students the most and which gave the best result in terms of competence of building a robot and then program it.

Swedish students CODESKILLS4ROBOTIC Piloting Moments



Robot Rea Construction and Programming

As analytically outlined in the previous sections, the **Tool Kit Piloting Implementation** in all partner countries was materialized on the basis of the specific contextual factors affecting each partner organization in **Greece**, **Cyprus** and **Sweden**. The Tool Kit is regarded as a very essential and empowering tool, not only for practical reasons to facilitate the implementation of the Program, but most importantly it is a comprehensive way to ensure quality control and assurance for all organizations as the Kit will be the basis against which the implementation process will be assessed.

Hence, following the Tool Kit Piloting implementation process each partner proceeded with the completion of the necessary templates, provided by the IO5 leader, offering the latter their input pertaining to the evaluation of the piloting implementation process. Hence, the insights gained constitute part of the Tool Kit **Evaluation** that is an integral part of the project's next intellectual Output, i.e. **IO6**.

6. Next Steps - IO6

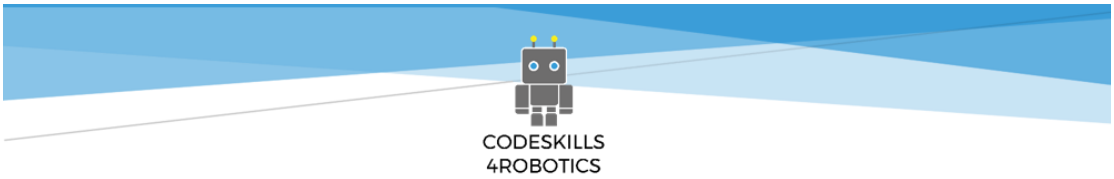
The next and last set of project results will include the following:

- A comprehensive evaluation of the Tool Kit Implementation**,** focusing on the **evaluation of piloting results** and an **overall** Tool kit **impact** on the basis of the CODESKILLS4ROBOTICS piloting case study per each partner organization.
- A Design of the DIGITALSKILLS@SCHOOLS Policy Recommendation Pack for Upscaling -Sustainability Strategy, including ideas and proposal to ensure the sustainability and mainstreaming of project results and to disseminate the policy recommendations at local and national level.
- Setting Up the DIGITALSKILLS@SCHOOLS Policy Community
- Digital Policy Recommendation Movement (EU Digital Week), including a set of policy recommendations in support for the importance of digital skills upscaling.

ANNEXES

A] Templates for the implementation of CODESKILLS4ROBOTICS Program

A.1 - Invitation Letter to Schools



Location, ... /..... / 2021

Subject:

INVITATION LETTER TO PARTICIPATE IN CODESKILLS4ROBOTICS PILOTING IMPLEMENTATION

Dear ..... (School Head-teacher/Principal)

The [**Partner**] would like to invite you to participate in a pilot-test of the Erasmus+ Programme **CODESKILLS4ROBOTICS: Promoting Coding and STEM Skills Through Robotics: Supporting Primary Schools to Develop Inclusive Digital Strategies for All** (Project Number: **2018-1-EL01-KA201-047823**).

The project is coordinated by the National Centre for Scientific Research "Demokritos" (Greece) in cooperation with 5 other organizations:

- Lifelong Learning Platform (Belgium)
- Regional Directorate of Primary and Secondary Education of Crete (Greece)
- Hellenic Mediterranean University (Greece)
- Hälsinglands Utbildningsförbund (Sweden)

The **CODESKILLS4ROBOTICS** project's partners aim to support local school communities (teachers, students and parents), and, therefore, they have decided on developing the following useful outcomes:

- The Coding, Robotics and STEM Competence Framework
- A Dual Educational Pack which contains:
  1. Teaching Packs for the Coding/STEM skills
  2. Teachers Professional Development Course for the acquisition of Digital Skills
  3. Parents upskilling course for raising awareness and skills acquisition
  4. Cross-curricular scenarios for Robotics related to specific subjects of the NC

- A list of resources, which include professional opportunities for teachers and training opportunities for students
- An e-learning platform with various resources for teachers and students
- A training programme for teachers and students.

You can visit the official website of the project at: http://codeskills4robotics.eu, as well as the e-learning platform at: http://codeskills4robotics.iit.demokritos.gr in order to learn more about the **CODESKILLS4ROBOTICS** project.

The **CODESKILLS4ROBOTICS** consortium welcomes you to engage in the pilot-test of our project, get trained, assessed and evaluated. Your participation matters.

Do you have any questions? Please do not hesitate to contact us, so that we can provide you with all the information you need.

We are looking forward to meeting you!

Sincerely,

.....

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ
ΙΚΥ

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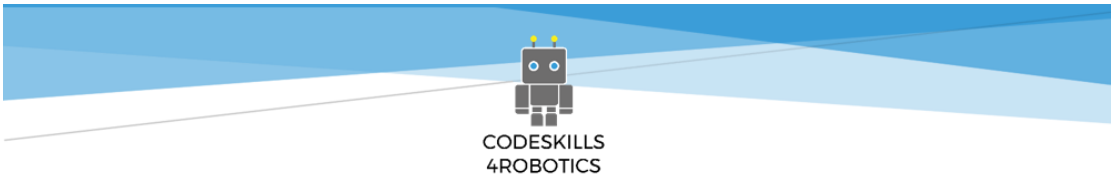
A.2 - Invitation Letter to Catering Companies



Location, ... /..... / 2021

Mr John Smith
Head of HR Department
Nicosia, CYPRUS

Subject:

Request letter for food to primary school students at DIGITALSKILLS@SCHOOLS CLUBS as part of the Erasmus+ CODESKILLS4ROBOTICS project

Dear Company Name,

[School Name] will organise the DIGITALSKILLS@SCHOOLS CLUBS as part of the Erasmus+ programme CODESKILLS4ROBOTICS, between the [dates], [time], at [venue].

During this period, we will host [number] of students and [number] of teachers who will attend coding and robotics classes on a daily basis.

But we wouldn't have been able to support those students on their educational journeys without sponsors like [Company Name].

Will [Company Name] consider becoming a featured partner of [School Name]?

As a show of gratitude, we would display your logo in our banner and posters that will be designed for the promotion of this training programme.

A sponsorship of [] per [time period] can make a huge difference in our DIGITALSKILLS@SCHOOLS CLUBS community.

Is [Company Name] ready to become a sponsored partner of [School Name]?

We look forward to hearing back from your team at [contact information].

Sincerely,

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ
ΙΚΥ

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A.3 - Appreciation Letter to Visiting Companies

CODESKILLS
4ROBOTICS

Date .....

Mr John Smith
Head of HR Department
Nicosia, CYPRUS

Subject:

Visit of a group of students as part of the Erasmus+ CODESKILLS4ROBOTICS project

We are writing to you with regards to the visit of the students attending the CODESKILLS4ROBOTICS PROGRAMME organized as part of the Erasmus+ project CODESKILLS4ROBOTICS: Promoting Coding and STEM Skills Through Robotics: Supporting Primary Schools to Develop Inclusive Digital Strategies for All (Project Number: 2018-1-EL01-KA201-047823) and we would like to express our gratitude and appreciation for the professional organization of the visit and the great hospitality of your team at [COMPANY NAME].

The students were excited with the opportunity to visit the headquarters of [COMPANY NAME] in [Cyprus]. It was an excellent experience and all students were thrilled. We are extremely pleased that through this visit the students had the opportunity to get a first-hand experience on the professional way a huge organization works. They were really motivated and they now have a clearer view of the potential and options opening up for them in the future. Our aim to broaden up their prospects for studying and working in the digital field has been fully achieved.

We would like to thank [Mrs NAME SURNAME] for organizing the whole visit, as well as [Mrs NAME SURNAME] and [Mr NAME SURNAME] for their time and willingness to answer all questions posed to them, but above all for sharing with us the 'team' spirit of [COMPANY NAME].

Thanking you once more for your cooperation!

Sincerely,

.....

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ
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A.4 - Student Registration Form

CODESKILLS
4ROBOTICS

REGISTRATION FORM

PART A – STUDENT'S DETAILS

Name & Surname: .....

Date of Birth: .....

ID Number: .....

School: .....

Class: .....

Tel/Email: .....

PART B – CONTACT DETAILS

Father's Name: .....

Mother's Name: .....

Address: .....

Post Code: .....

Email: .....

Resident's Telephone Number: .....

Father's Telephone Number: .....

Mother's Telephone Number: .....

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ IKY

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A.5 - Parental Consent for Participation Form

CODESKILLS
4ROBOTICS

PARENTAL CONSENT

Dear Parent

[SCHOOL NAME] is pleased to inform you that our students have the opportunity to participate in the implementation of the CODESKILLS4ROBOTICS project. With this letter we would like to ask your permission to allow your child to take part in the training programme of this project.

In order for your child to participate in the project, please complete and return the form to your child's class teacher. If at any point you decide to withdraw your child from the project, you can do so without having to provide any explanation.

Project's description:

The Erasmus+ Project **CODESKILLS4ROBOTICS: Promoting Coding and STEM Skills Through Robotics: Supporting Primary Schools to Develop Inclusive Digital Strategies for All (Project Number: 2018-1-EL01-KA201-047823)** is coordinated by the National Centre for Scientific Research "Demokritos" (Greece) in cooperation with 5 other organisations:

- Lifelong Learning Platform (Belgium)
- Regional Directorate of Primary and Secondary Education of Crete (Greece)
- Hellenic Mediterranean University (Greece)
- Hälsinglands Utbildningsförbund (Sweeden)

The **CODESKILLS4ROBOTICS** project pioneers to design an innovative programme which aims to introduce 'Coding and Robotics' to primary school students (9-12) by:

- Supporting schools to design their own DIGITALSKILLS@SCHOOL Strategy / Action Plan in order to implement the CODESKILLS4ROBOTICS programme.
- Utilizing the extra-curricular time available in a constructive way to set up CODESKILLS4ROBOTICS Clubs in schools / educational institutions for students who voluntarily want to learn how to code, as purported by the COM (2015)408 ET2020 report.
- Creating Synergies between the school and various stakeholders such as ICT professionals, providers, NGOs, enterprises etc. based on the principle of

Volunteers Mentors who will support and guide throughout the process the primary school (teaching staff) to set up and run a CODESKILLS4ROBOTICS Club.

- Introducing the Open Badges as a method to validate and award the coding skills and competences acquired by both the teachers and the students.

Student Name:
Parent Name:

This is to confirm that I ……, give permission / do not give permission to my child ……, to take part in the CODESKILLS4ROBOTICS program.

Date: _____ Signature: _____

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ IKY

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A.5.1 - Parental Consent for Taking Photos

CODESKILLS
4ROBOTICS

PARENTAL CONSENT FOR TAKING PHOTOS

Dear parent,

[SCHOOL NAME] recognizes the need to ensure the welfare and safety of all people taking part in the training programme. We would like to also ask for your consent to take photographs/videos of the event or activities as part of the piloting implementation of the CODESKILLS4ROBOTICS in which our school participates and that may contain images of your child. It is likely that these images may be used as:

- A record of the activity or the event
- Publicity material for further activities or events on leaflets / websites / magazines
- Illustrations of the activities or events in published articles

We will take all steps to ensure these images are used solely for the purposes they are intended. If you become aware that these images are being used inappropriately you should inform us immediately.

Student Name:
Parent Name:

This is to confirm that I ....., **consent / do consent** [SCHOOL NAME] to take photographs and/or videos of my child.

Date: _____ Signature: _____

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ IKY

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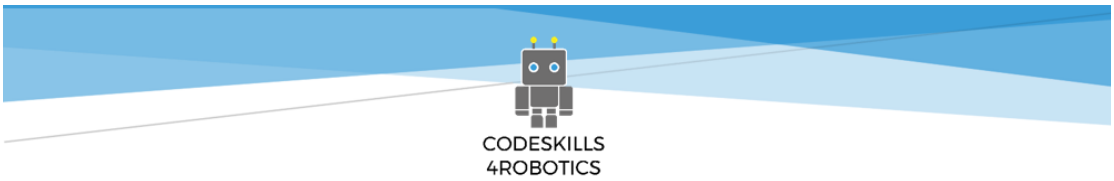
A.6 - Teacher Consent for Taking Photos Form



CONSENT FOR TAKING PHOTOS

Dear Teacher,

[SCHOOL NAME] recognizes the need to ensure the welfare and safety of all people taking part in the training programme. We would like to also ask for your consent to take photographs/videos of the event or activities as part of the piloting implementation of the CODESKILLS4ROBOTICS in which our school participates and that may contain images of you. It is likely that these images may be used as:

- A record of the activity or the event
- Publicity material for further activities or events on leaflets / websites / magazines
- Illustrations of the activities or events in published articles

We will take all steps to ensure these images are used solely for the purposes they are intended. If you become aware that these images are being used inappropriately you should inform us immediately.

Teacher's Name:

This is to confirm that I ……, **consent / do consent** [SCHOOL NAME] to take photographs and/or videos of me.

Date: _____ Signature: _____

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

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A.7 - Participation List

CODESKILLS
4ROBOTICS

PARTICIPATION LIST

DATE:

SCHOOL NAME:

ADDRESS:

This is to certify that between the ..... and ....., the pilot testing programme of the **CODESKILLS4ROBOTICS** project was organised at ....., with the participation of ..... pupils and ..... educators.

The training was organised as part of the Erasmus+ School Sector programme **CODESKILLS4ROBOTICS: Promoting Coding and STEM Skills Through Robotics: Supporting Primary Schools to Develop Inclusive Digital Strategies for All** (Project Number: **2018-1-EL01-KA201-047823**)

Due to the GDPR policy of our school the pupils cannot sign the participation list. Therefore, I verify that all students participated in the programme, which was a huge success.

Sincerely,

.....

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

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A.8 - Weekly Schedule

CODESKILLS
4ROBOTICS

WEEKLY SCHEDULE

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY

DATES:
VENUE:

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

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A.9 - Project Activities Report

CODESKILLS
4ROBOTICS

PROJECT ACTIVITIES REPORT

Date	
School	
Teacher's Name	
Student's Name	
Training Module	
Description of Activities	
Learning Outcomes	
Photos or Other Relevant Material	

Date: _____ Signature: _____

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

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B] Templates for the Evaluation of the Implementation of CODESKILLS4ROBOTICS Program

B.1 - Student Evaluation Form

CODESKILLS
4ROBOTICS

STUDENT EVALUATION FORM

Organization

….. /….. / 2021

Location

Dear Students,

We hope you have enjoyed the **CODESKILLS4ROBOTICS** classes and we would like to have your opinion on them because it is valuable!

NAME: ……

(Please do not write your surname!)

Please read the following statements and mark your answers with an X, according to the following scale, where 5 is Totally agree and 1 is Totally disagree:

Totally Disagree				Totally Agree
1	2	3	4	5

		1	2	3	4	5
1	I really liked the CODESKILLS4ROBOTICS classes					
2	The robotics lessons were very interesting for me					
3	The CODESKILLS4ROBOTICS eLearning platform is easy to use and helpful					
4	The teaching material in the e learning platform is interesting and helpful for me					
5	I learned new things about Coding and Robotics					

6	I really liked the robots REA, Vernie, M.T.R.4 and Guitar 4000					
7	I liked the Digital Badges I earned a lot!					
8	I would like to have more Coding and Robotics classes					
9	I would recommend the CODESKILLS4ROBOTICS eLearning platform to my friends to use					
10	I would recommend other students in my school to have CODESKILLS4ROBOTICS classes					
11	I will use all the things I learned in my Robotics classes both at school and in my everyday life					

What did you enjoy most about your robotics classes?

Thank you for your participation!

More information:

Project Website: http://codeskills4robotics.eu/
e-Learning Platform: http://codeskills4robotics.iit.demokritos.gr/

ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ IKY

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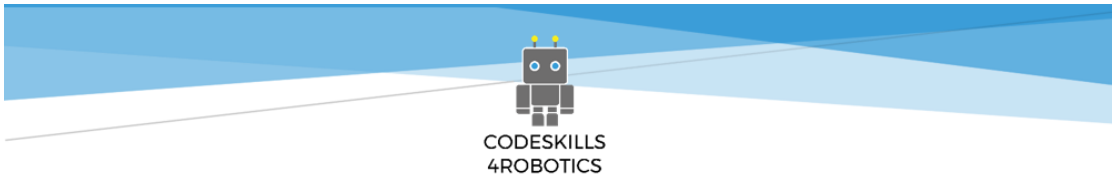
B.2 - Teacher Evaluation Form I



Teacher Evaluation Form I

Organization

….. /….. / 2021

Location

We would like to have your opinion on the organisational aspects and the overall quality for the pilot-training programme.

Please complete the evaluation form. Your feedback is valuable.

You are:

Teacher……

Optional:

Name ……

Email ……

Please read the following statements and mark your answers with an X, according to the following scale, where 5 is totally agree and 1 is totally disagree:

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

		1	**2**	**3**	**4**	**5**
1.	The training was very well organised (location appropriate, clear and balanced agenda, satisfactory working environment, appropriate time schedule, etc.).					
2.	The presented results are clear.					

3.	Generally, the CODESKILLS4ROBOTICS Training Material and Tools are of good quality and efficiently support the Training.					
4.	The Online CODESKILLS4ROBOTICS Training is really helpful.					
5.	The CODESKILLS4ROBOTICS eLearning platform is an easy-to-use and practical tool.					
6.	The CODESKILLS4ROBOTICS eLearning platform is helpful and innovative.					
7.	The CODESKILLS4ROBOTICS eAcademy can help me get directly in contact with the project partners.					
8.	This session was helpful and increased my knowledge.					
9.	I feel motivated to apply the knowledge and tools that I gained today in my work/daily life.					
10	Would you recommend CODESKILLS4ROBOTICS eLearning platform to others?					

Any other comment worth of mention/proposals/suggestions

Thank you for your participation!

For more information:

Project's website: http://codeskills4robotics.eu/
Project's e-platform: http://codeskills4robotics.iit.demokritos.gr/

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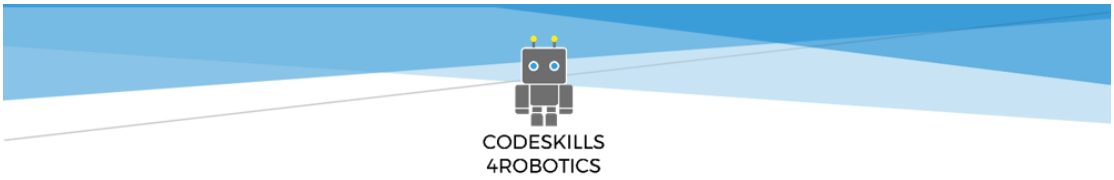
B.2.1- Teacher Evaluation Form II (Tool Kit Pilot)



Organization

….. /….. / 2021

Location

Dear teachers,

After the completion of the CODESKILLS4ROBOTICS piloting we would like to have your feedback on it, as it is valuable for us.

Please fill in the following information:

Name: ……

(Please do not mention your surname)

1. Where do you work and which subject do you teach?

……

2. How long have you been teaching?

……

3. Why are Robotics and Coding skills necessary and useful for you?

……

……

4. How do you assess theCODESKISS4ROBOTICS piloting for your students?

……

……

5. Did your students find CODESKILLS4ROBOTICS lessons interesting?

……

.....

6. Did your students find the CODESKILLS4ROBOTICS e-platform easy to use and helpful?

.....

.....

7. Do you think the teaching material in the e-platform is helpful and interesting for the students?

.....

.....

8. Did your students acquire new robotics and coding skills during the piloting?

.....

.....

9. Do you think the acquisition of Badges is motivating for your students?

.....

.....

10. How many badges did your students obtain?

.....

.....

11. Do you intend to use CODESKILLS4ROBOTICS Tool kit to teach robotic skills to the other students in your class?

.....

.....

12. Would you recommend your colleagues to implement the CODESKILLS4ROBOTICS Tool Kit with their students?

.....

.....

13. Are there any suggestions for improvement that you would like to make?

.....

.....

Thank you for your participation!

More information:
Project Website: http://codeskills4robotics.eu/
e-Learning Platform: http://codeskills4robotics.iit.demokritos.gr/

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B.3 - Teacher Testimonial Sample

CODESKILLS
4ROBOTICS

TEACHER-MENTOR TESTIMONIAL SAMPLE

Dimitra,

Primary school teacher, Greece

I am currently teaching at 2nd Primary school in Heraklio, Crete and I have been teaching for 10 years. Robotics and Coding skills are necessary for enhancing my teaching profile and will allow me to teach my own students the basic coding skills. I admit that my students found their classes very useful and catering to their needs. They were very keen on using the e-platform and really appreciated the teaching material in the platform which helped them study more on their own the basic concepts taught in our class. In fact, my students acquired several new skills and are now able to implement basic coding concepts. They managed to obtain 3 badges each and they were keen on the idea. I would definitely recommend the Tool kit to my colleagues as it is very innovative and I am also planning to use it so as to teach the rest of my class all the new skills we acquired during the piloting with my students. It would be a good idea to have more time to devote to our classes.

B.4 - Student Testimonial Sample

CODESKILLS
4ROBOTICS

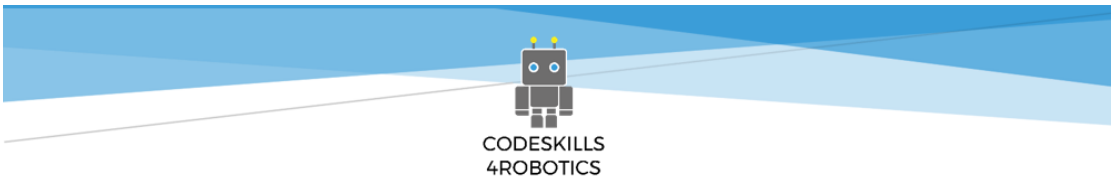
STUDENTS TESTIMONIAL SAMPLE

Maria,

Primary school student, Greece

I am in the 6 year of 2nd Primary school in Heraklio, Crete. I really liked the CODESKILLS4ROBOTICS classes and the CODESKILLS4ROBOTICS eLearning platform was very easy to use and very helpful and the learning material as well. Of course, I learnt new things about Coding and Robotics and I loved the badges I earned! I would like to have more Coding and Robotics classes. What I especially liked were the robots and that I cooperated with my friends. Of course, I would recommend my friends to use the CODESKILLS4ROBOTICS e-learning platform and also the other students in my school to have CODESKILLS4ROBOTICS classes. I am sure, I will use all the things I have learned in my Robotics classes both at school and in my everyday life.

B.5 - Teacher and Student Testimonial Guide and Templates



TEACHER AND STUDENT TESTIMONIAL GUIDE

In addition to the quantitative and qualitative input of the three basic evaluation Forms employed to **evaluate** the Tool Kit **Implementation**, which are readily available in **Annex** B of the current **IO5**, the overall evaluation process of the **CODESKILLS4ROBOTICS** implementation at schools/institutions can be additionally supplemented by the input of 1-2 teacher testimonials and 2-4 student testimonials from the participating schools/institutions.

Hence, the present guide contains useful and practical guidelines on how to develop the teachers' and students' testimonials, providing the relevant testimonial templates and sample templates as well.

Testimonials will be collected on the basis of the input from

a. Student evaluation form that students will complete when the project implementation phase finishes
b. Teacher Evaluation Form 2 (Tool Kit Pilot) that teacher-mentors will complete when the piloting phase finishes.

Below, **some indicative examples** of the questions and the corresponding item questions in each evaluation forms that could be included, are provided. The answers to the aforementioned questions could inform the content of the teacher and student testimonials to be produced. Furthermore, various **teacher and student testimonial templates** are offered too.

Teacher-Mentor Testimonial Questions Template

(The following questions correspond to **Teacher Evaluation form 2: Tool Kit Pilot items)**

4. Where do you work and which subject do you teach? **(Item 1**)
5. How long have you been teaching? **(Item 2)**
6. Why are Robotics and Coding skills necessary and useful for you? **(Item 3)**
7. How do you assess the CODESKISS4ROBOTICS piloting for your students? **(Item 4)**
8. Did your students find CODESKILLS4ROBOTICS lessons interesting? **(Item 5)**
9. Did your students find the CODESKILLS4ROBOTICS e-platform easy to use and helpful? **(Item 6)**
10. Do you think the teaching material in the e-platform is helpful and interesting for the students? **(Item 7)**
11. Did your students acquire new robotics and coding skills during the piloting? **(Item 8)**
12. Do you think the acquisition of Badges is motivating for your students? **(Item 9)**
13. How many badges did your students obtain? **(Item 10)**
14. Do you intend to use CODESKILLS4ROBOTICS Tool kit to teach robotic skills to the other students in your class? **(Item 11)**
15. Would you recommend the CODESKILLS4ROBOTICS Tool Kit to your colleagues? **(Item 12)**
16. Are there any suggestions for improvement that you would like to make? **(Item 13)**

CODESKILLS
4ROBOTICS

TEACHERS TESTIMONIALS TEMPLATES

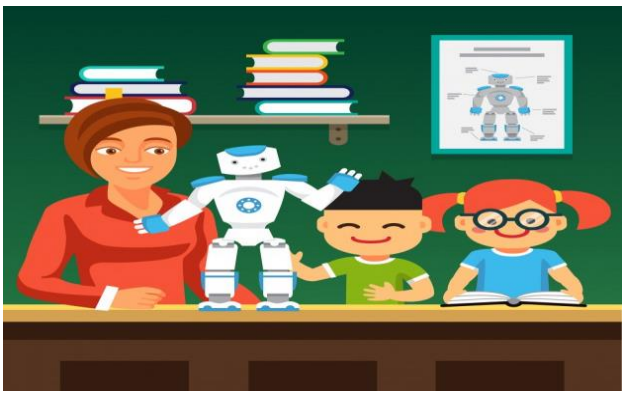
Student Testimonial Questions Template

(The following questions correspond to **Student Evaluation form items)**

1. Which class are you in? (Information to be found in the Registration Form)
2. Did you really like the CODESKILLS4ROBOTICS classes? (items 1,2)
3. Was the CODESKILLS4ROBOTICS eLearning platform easy to use and helpful? (item 3)
4. Was the teaching material in the e learning platform interesting and helpful for you? (item 4)
5. Did you learn new things about Coding and Robotics? (item 5)
6. Did you like and earn a lot of badges? (item 7)
7. Would you like to have more Coding and Robotics classes? (item 8)
8. What did you enjoy most about your robotics classes? (Last open-ended question)
9. Would you recommend your friends to use the CODESKILLS4ROBOTICS e-learning platform? (item 9)
10. Would you recommend other students in your school to have CODESKILLS4ROBOTICS classes (item 10)
11. Will you use all the things you learned in your Robotics classes both at school and in my everyday life? (item 11)

CODESKILLS
4ROBOTICS

STUDENT TESTIMONIALS TEMPLATES



B.6. CODESKILL4ROBOTICS Tool Kit Implementation Evaluation Guide

The present guide was used to direct the **evaluation** process of the **Tool Kit Piloting Implementation,** as analytically described in section **2.2**. of **IO6. Evaluation of Tool Kit Piloting Implementation.**

In particular, the evaluation of the Tool Kit Pilot implementation at the associated schools or in-house in each partner country was based on the quantitative and qualitative feedback drawn from the **three** evaluation tools developed both for the teachers and the students for purposes of triangulation. The **evaluation forms** employed, which constitute an integral part of the Tool Kit and can be found in **Annex B of the current IO5**, are the following:

- Teacher Evaluation Form I
- Teacher Evaluation Form II (Tool Kit Pilot)
- Student Evaluation Form

Student quantitative questionnaire included 12 statements of agreement on 1-5 Likert scale, offering also the opportunity for qualitative feedback by means of an open-ended question. A first teachers' quantitative questionnaire of quite similar content to that of the students was designed for reasons of triangulation. Furthermore, a second open-ended questions teacher evaluation form was designed, aiming for the qualitative input to allow to delve deeper into their perceptions and form a clearer picture of the impact of piloting testing of the CODESKILLS4ROBOTICS program.

An evaluation framework was developed to guide the item analysis of the data obtained from the aforementioned evaluation forms. Hence, the following table illustrates the **evaluation criteria** set and the corresponding evaluation form items measuring them.

EVALUATION CRITERIA	Teacher Evaluation Form I	Teacher Evaluation Form II 2 (Tool Kit Pilot)	Student Evaluation Form
Usefulness of the content of the robotics lessons		Questions 4,5	Questions 1,2
Quality of the teaching material in the e-platform		Question 7	Question 4
Usefulness and Quality of the e-learning platform	Question 5, 6	Question 6	Question 3
Usefulness of the Open badges		Question 9, 10	Question 7
Special value of the CODESKILL4ROBOTICS Tool Kit Implementation classes		Question 3	Last Open-Ended Question
Leaning Impact of the Tool Kit implementation classes		Question 8	Questions 5, 8
Participants intentions to further exploit the program products in their life	Question 9	Question 11	Questions 11
Participants intentions to recommend the platform and the program to others	Question 10	Question 12	Questions 9-10

Besides the quantitative input of the three **evaluation forms** for the **evaluation of Tool Kit Piloting implementation, use was made of the input of teacher-mentor testimonials and student testimonials,** acting as supplementary qualitative evidence to support the feedback given by the partners.

Overall, the present guide along with all the evaluation forms and the testimonial templates, provided in the present Annexes, can be modified and tailed to the specific context of those schools and institutions interested to implement the CODESKILLS4ROBOTICS Program, in order to facilitate the evaluation process upon its completion.

C] CODESKILLS4ROBOTICS Program Roadmap implementation

READ THE COMPARATIVE REPORT	1	The comparative report presents the current practice in Greece, Cyprus, Belgium and Sweden in relation to the teaching of digital, coding and robotic skills in primary education.
CONSULT THE COMPETENCE FRAMEWORK	2	The Competence Framework presents the digital skills and serves as a basis for the monitoring and assessment of the students' progress.
STUDY THE EDUCATIONAL PACK	3	The educational pack includes the teaching and learning material with all the accompanying creative, interactive and motivational learning modules.
UNDERSTAND THE ASSESSMENT METHODOLOGY	4	The Open Badges system which is based on the Competence Framework is used for the recognition and validation of the new skills acquired by primary school students.
REGISTER AND FAMILIARISE YOURSELF WITH THE ELEARNING PLATFORM	5	The eLearning platform hosts the Competence Framework, the teaching material as well as the data bank resources. It serves as the learning, assessment, monitoring and community tool.
BECOME A MENTOR	6	Primary school teachers who complete successfully the "Become a Mentor" quiz on the eLearning platform will receive the Mentor Badge and become the Mentors.
ORGANISE WORKSHOP FOR YOUR COLLEAGUES	7	Teacher/Mentors can take on the initiative to train their colleagues who wish to participate in the programme.
CREATE SYNERGIES AND RUN THE CAMPAIGN	8	The creation of synergies will be achieved by exploring other initiatives happening in your country to identify other stakeholders - Run the campaign for the promotion of the programme and the DIGITALSKILLS @SCHOOLS Clubs.
ORGANISE AN INFO DAY FOR STUDENTS AND PARENTS	9	The organization of info days/open days are a great opportunity to promote coding and robotics skills and digital competences for primary school parents and students and the upcoming implementation of the CODESKILLS4ROBOTICS programme.
ORGANISE & EVALUATE THE CODESKILLS4ROBOTICS PROGRAMME	10	For the implementation of the CodeSkills4Robotics programme, all the necessary templates from the time of the registration to the time of completion of the programme are provided.

CODESKILLS
4ROBOTICS

The road to the implementation

CODESKILLS4ROBOTICS
training programme

http://codeskills4robotics.eu/
http://codeskills4robotics.iit.demokritos.gr/

Bibliography

Afari E. & Khine, M.S. (2017). Robotics as an Educational Tool: Impact of Lego Mindstorms. *International Journal of Information and Education Technology*, 7(6), 437-442

Alimisis, D. (2009). Robotic technologies as vehicles of new ways of thinking, about constructivist teaching and learning: the TERECoP Project. *IEEE Robotics and Automation Magazine,* 16(3), 21-23.

Alimisis, D. (2013). Educational Robotics: new challenges and trends. *Themes in Science and Technology Education*, 6(1), 63-71. URL: http://earthlab.uoi.gr/theste.

Anwar, S., Bascou, N. A., Menekse, M., & Kardgar, A. (2019). A Systematic Review of Studies on Educational Robotics. *Journal of Pre-College Engineering Education Research (J-PEER)*, 9(2), Article 2, 19-42.

Bell, B.S., Kozlowski, S.W.J., 2008. Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability, Journal of Applied Psychology, pp. 296–316.

CODESKILLS4ROBOTICS (2019). *Comparative Report, Codeskills4Robotics: Promoting Coding & STEM Skills through Robotics: Supporting Primary Schools to Develop Inclusive Digital Strategies for All.* Retrieved on 30.06.2020 from: http://codeskills4robotics.eu/wp-content/uploads/2019/09/CS4R_COMPARATIVE_REPORT.pdf

Detsikas, N., & Alimisis, D. (2011). Status and trends in educational robotics worldwide with special consideration of educational experiences from Greek schools. In D. Bezakova & I. Kalas (eds.), *Proceedings of the International Conference on Informatics in Schools: Situation, Evolution and Perspectives* (pp. 1-12). Bratislava: Comenius University.

Eguchi, A. (2010). What is educational robotics? Theories behind it and practical implementation. In D. Gibson & B. Dodge (eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2010* (pp. 4006-4014). Chesapeake, VA: AACE.

Eguchi, A. (2014). Educational robotics theories and practice: Tips for how to do it right. In *Robotics: Concepts, methodologies, tools, and applications: concepts, methodologies, tools, and applications, IGI Global*, 193–223.

Eguchi, A. (2007). "Educational Robotics for Elementary School Classroom." In: Proceedings of the Society Information Technology and Education (SITE), San Antonio, TX, AACE.

Eguchi, A. (2014). "Educational Robotics for Promoting 21st Century Skills", *Journal of Automation, Mobile Robotics & Intelligent Systems*, V. 8, N° 1.

European Schoolnet (2015*): Robotics for Schools – Bringing Code to Life Guidelines for Policy Making. Priorities, school curricula and initiatives across Europe*. European Schoolnet. Contributors: Lahti Aleksi, Jaakkola Tomi, Veermans Koen. Retrieved from https://www.roboticsforschools.eu/images/a1policydocumentv2-2.pdf at 30 of June 2020

Faisal, A., Kapila, V., & Iskander, M. G. (2012). Using robotics to promote learning in elementary grades. In *119th ASEE Annual Conference and Exposition (ASEE Annual Conference and Exposition, Conference Proceedings)*. American Society for Engineering Education

Gorakhnath, I. & Padmanabhan, J. (2017). Educational Robotics in Teaching Learning Process. *Online International Interdisciplinary Research Journal*, 07, Special Issue (02), 161-168

Gura, M. (2012). Lego Robotics: STEM Sport of the Mind. *Learning and Leading with Technology*, 40, 12-16

Khanlari, A. & Kiaie F.M. (2015). Using Robotics for STEM Education in Primary/Elementary Schools: Teachers' Perceptions. In *10th International Conference on Computer Science and Education, ICCSE*.

La Paglia, F., Rizzo, R., & La Barbera, D. (2011). Use of robotics kits for the enhancement of metacognitive skills of mathematics: A possible approach. *Studies in Health Technology and Informatics*, 167, 26-30.

Lathifah, A., Budiyanto, C. W. & Yuana, R. A. (2019). The contribution of robotics education in primary schools: Teaching and learning. *AIP Conference Proceedings 2194, 020053 (2019)*

Lin, C. H., & Liu, E. Z. F. (2011). A pilot study of Taiwan elementary school students learning motivation and strategies in robotics learning. In *International Conference on Technologies for E-Learning and Digital Entertainment* (pp. 445-449). Springer Berlin Heidelberg

Litinas, A., & Alimisis, D. (2013). Planning, implementation and evaluation of lab activities using robotic technology for teaching the phenomenon of motion. In A. Ladias, A. Mikropoulos, C. Panagiotakopoulos, F. Paraskeva, P. Pintelas, P. Politis, S. Retalis, D. Sampson, N. Fachantidis, & A. Chalkidis (eds.), *Proceedings of the 3rd Pan-Hellenic Conference "Integration and Use of ICT in Educational Process"*. Piraeus: HAICTE & University of Piraeus (in Greek).

Misirli, A., Komis, V., & Ravanis, K. (2019). The construction of spatial awareness in early childhood: the effect of an educational scenario-based programming environment. *Review of Science, Mathematics and ICT Education*, 13(1), 111-124.

Mubin, O, Stevens, CJ, Shadid, S, Al Mahmud, A & Dong, JJ. (2013) A review of the applicability of robots in education. *Technology for Education and Learning*, 1, 1-7

Okita, S.Y., Ng-Thow-Hing, V., and Sarvadevabhatla, R. (2009) Learning together: asimo developing an interactive learning partnership with children, *Proc. ROMAN*, 1125–1130

Papert, S. (1980). Children, Computers, and Powerful Ideas. Basic Books, Inc., New York

Partnership for 21st Century Skills (2008), "21st Cenutry Skills, Education & Competitiveness – A Resource and Policy Guide," Ανακτήθηκε 10/7/2020 από https://files.eric.ed.gov/fulltext/ED519337.pdf.

Pellegrino, J. W., Hilton, M. L. (Eds.), Committee on Defining Deeper Learning and 21st Century Skills, Center for Education, Board on Testing and Assessment, Division of Behavioral and Social Sciences and Education & National Research Council. (2012). Education for life and work: Developing transferable knowledge and skills in the 21st century. The National Academies Press. Retrieved from http://www.p21.org/storage/documents/Presentations/NRC_Report_Executive_Summary.pdf

Rubenstein, M., Cimino, B., Nagpal, R., & Werfel, J. (2015). AERobot: An affordable one-robot-per-student system for early robotics education. *IEEE International Conference on Robotics and Automation (ICRA)*, 6107–6113

Ruiz Vicente F., Zapatera A., Montes N., Rosillo N. (2020) STEAM Robotic Puzzles to Teach in Primary School. A Sustainable City Project Case. In: Merdan M., Lepuschitz W., Koppensteiner G., Balogh R., Obdržálek D. (eds) *Robotics in Education. RiE 2019. Advances in Intelligent Systems and Computing*, vol 1023. Springer, Cham, 65-76

Siciliano B., Khatib O., (2016): *Springer Handbook of Robotics*, Springer International Publishing, Switzerland.

Socratous, C. & Ioannou, A. (2019). An Empirical Study of Educational Robotics as Tools for Group Metacognition and Collaborative Knowledge Construction. *CSCL 2019 Proceedings (International Conference on Computer Supported Collaborative Learning)*, 192-199.

Socratous, C. & Ioannou, A. (2020). Using Educational Robotics as Tools for Metacognition: An Empirical Study in Elementary STEM Education. *Conference: Immersive Learning Research Network Conference- iLRN 2019*. DOI: https://doi.org/10.3217/978-3-85125-657-4-11.

Stergiopoulou M., Karatrantou A., Panagiotakopoulos C. (2017). Educational Robotics and STEM Education in Primary Education: A Pilot Study Using the H&S Electronic Systems Platform. In: Alimisis D., Moro M., Menegatti E. (eds) *Educational Robotics in the Makers Era*. Edurobotics *2016 2016. Advances in Intelligent Systems and Computing*, vol 560. Springer, Cham.

Voogt, J., Erstad, O., Dede, C., Mishra, P., 2013. Challenges to learning and schooling in the digital networked world of the 21st century, *Journal of Computer Assisted Learning*.

Greek Bibliography

Atmatzidou, S. (2018), Educational Robotics as a means to develop Computational Thinking and Metacognition of students. PHD Thesis, Aristotle University of Thessaloniki (A.P.TH.)

Koliadis, E. (1997). *Learning Theories and Educational Praxis. Socio-Cognitive Theories*. Vol. B, Self-edition.

Koutsoukos, A. and Z. Smyrnaiou, (2007), *Cognitive Psychology and Teaching: The Contribution of Jean Piaget in Contemporary Pedagogical and Didactic Thinking*, Herodotus Publications, Athens.

ICT Curriculum for Primary Education, *''New School (21st Century School) - New Curriculum*, 2011, Ministry of Education and Religious Affairs.