# NATIONAL REPORT - GR

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

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

Partners: Regional Directorate of Primary and Secondary School Education of Crete, Hellenic Mediterranean University, N.C.S.R. “Demokritos”, Greece

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## Executive Summary

In this report, we present the Digital education policies for primary school education in Greece for Coding, Robotics and STEM skills. It is explained how coding, robotics and STEM skills are integrated in the school curriculum in Greece. Moreover, infrastructures in primary schools that support ICT and Robotics are also presented. Finally are given the results from an empirical research survey conducted in Greece for  the needs of the primary teachers and students for coding skills and STEM education, according to the EU Recommendations.

CODESKILLS 4ROBOTICS

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## 1. Introduction

Programming and computational thinking skills are becoming ever more important in our society and working life: an increasingly digitalized economy has transformed the labor market and brought digital skills to the forefront of the educational scene. As emphasized by the 2015 new priorities ET 2020, "knowing how to code is empowering. It allows 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". In light of these recommendations, ICT school curricula have been shifting their focus from computer literacy to digital literacy, i.e. on teaching students not only how to work a computer, but mostly how a computer works and how to make it work for you. Often selected as an introductory channel to programming, robotics effectively initiate students to various STEM disciplines while promoting transversal employability skills such as problem solving, leadership and creativity.

In the above context, the CODESKILLS4ROBOTICS project pioneers to design, pilot-test and evaluate a complete tool kit that will support primary schools in developing their own digital-inclusive strategies for the promotion of coding, robotics and STEM skills. Another aim of the project is to develop an educational pack containing all the essential materials, tools and resources for the introduction of coding and robotics to primary schools. In addition, to introduce the Open Badges system as a method to validate and award the coding skills acquired by both teachers and students, in conjunction with digital assessment tools developed to this purpose. CODESKILLS4ROBOTICS will produce useful resources for the development and implementation of strategies to promote coding and educational robotics in primary schools.

## 2. 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 |

# 3. Coding, Robotics and STEM Skills in Primary Schools

## 3.1 Digital Education Policies for Primary School Education in Greece

### 3.1.1 The Greek National Policy for Digital School

#### First attempts

Large scale projects implemented in Greece during the past two decades introduced digital literacy in the school community and created a "critical mass" of teachers that utilize ICT in their school activities. During this first period, a large number of educational software products and learning resources for school education have been developed within various national initiatives. These experiences were valuable for the next steps on teaching supported by digital resources and the promotion of digital school.

#### National policy for digital school

Greece's Digital Teaching and Digital School's strategy generally, aims at integrating and incorporating Information and Communication Technologies (ICT) into the curriculum and everyday educational practice. The aim is for ICT to become:

- For teachers, a means of supporting current pedagogical approaches in teaching, learning, exchanging good practices with colleagues in the "global village", and opportunities for continuing education.
- For students a useful tool in learning, problem solving, developing critical thinking and their creative ability.
- For the entire school community (students and teachers) a tool for collaboration among its members and communication with the rest of the world through the creation of multiple "digital learning communities".

The specific objectives of the digital strategy for schools are:

- The establishment of a variety of educational practices based on and exploiting the multiple possibilities offered by the modern digital educational environment.
- The formation of equal opportunities for digital competence development and access to digital content for all pupils and teachers.
- The possibility of full and immediate integration of continuous technological innovation and novelties, into the educational act.
- The existence of permanent infrastructure that will contribute to the creation of an efficient, continuously improved and decentralized education system without the need for constant interventions by central education agents and services.

It is obvious, therefore, that a digital strategy for schools is clearly opposed to techno-central perceptions, which treat ICT as an innovation or as a fashion trend of the era. ICT should be considered as a dynamic tool for cognitive development, which, with the appropriate mediation of the teacher, will contribute to a substantial upgrading of the educational process.

| Table I: Objectives of the Digital Strategy - Overall Expected Results | | |
|---|---|---|
| Use by teachers of ICT in the classroom | From 36% | To 75% |
| Schools with broadband | 30% | 65% |
| Schools with their own website | 37% | 70% |
| Students with e-mail accounts | 44% | 75% |
| Students per PC | 17 | 8 |

### Digital educational content

Digital educational content is a key priority of the Greek National Digital Educational Policy for primary and secondary education, which is reflected in the design of the national programs for the integration of ICT in school education. In-service teacher training and the development and operation of computational and networking infrastructure and services for schools, that include a national-level school network, school labs, e-classrooms and interactive teaching systems, are the other two pillars of the national policy, both strongly linked with the provision and exploitation of digital content. Following the directions of the 2020 digital agenda of Europe and the international trends, as well as taking into account the recent experiences, the key action lines of the Greek National Policy for Digital Educational Content are:

1. Focus on the creation of reusable units of learning
2. Promote Open Educational Resources (OERs)
3. Promote re-using, remixing, and re-purposing of existing digital learning resources
4. Improve digital infrastructure to facilitate search, retrieval, access and utilization of digital learning resources for all (teachers, pupils and parents)
5. Promote the active role of teachers and pupils in the creation, documentation and evaluation of digital learning resources (Megalou & Kaklamanis, 2014).

### 3.1.2 Current Model of Integration and use of Information and Communication Technologies (ICT) in Primary Schools

The factual model is a combination of technocratic/techno-centric (which puts greater importance to Information Technology (IT) teaching and emphasis on technological innovation) and holistic (which consider as important the cross-thematic and holistic approach to knowledge with emphasis on disseminating ICT-related knowledge to the whole range of the curriculum as well as in the pedagogical innovation). The factual model is characterized by the combination of teaching "pure" IT lessons and the simultaneous integration of ICT as a means of supporting the learning process in the various subject areas. Greece, like many other countries, followed the first model in a sequential fashion and gradually adapted to the second and third, mainly since the mid-1990s. The main feature is the generalized integration of ICT in various aspects of educational activity and the important efforts for ICT to be integrated throughout the curriculum. There have been developed and applied distinct curricula for ICT. Additionally there is provision for using ICT through the educational process of other subjects.

### 3.1.3 Information and Communication Technologies (ICT) in Primary Education

According to the Interdisciplinary Curriculum, "The purpose of introducing Informatics in kindergarten and elementary school is to familiarize students with the basic functions of the computer and get them in touch with its various uses as an educational equipment, as a cognitive - exploratory tool and as a tool for communicating and searching for information in their everyday educational activities using the appropriate software and especially open source software that supports exploratory learning". In other words, information technology literacy (development of technological knowledge and skills for computers and information technology) of children takes place through daily engagement of children with computers and activities, which are fully integrated into the curriculum.

According to the Interdisciplinary Curriculum, the aim of teaching Informatics in elementary school is the acquisition, by the students, of an initial but global and comprehensive perception of the basic computer skills, within the perspective of technological literacy and recognition of Information and Communication Technology, while developing wider critical thinking, ethics, social behavior and mood for activation and creativity both individually and in collaboration with others as well as, as members of a team. The teaching of Informatics aims to connect pupils with the various uses of the computer as an educational means, as a cognitive-exploratory tool (using the appropriate open, exploratory learning) and as a tool for communicating and searching for information in their everyday educational activities using the appropriate software and especially open source software that supports exploratory learning.

Thus, by acquiring the ability to understand the basic principles governing the use of computing technology in important human activities (such as: information and processing, communication, entertainment, new possibilities of approaching knowledge), there are created the necessary conditions favoring a pedagogical and didactic methodology centered on the learner, facilitating the differentiation and personalization of learning. Consequently, students acquire the necessary critical and social skills which will provide them with equal opportunities for access to knowledge and opportunities for lifelong learning.

In Primary School's curriculum the content and objectives are completely "transparent" for the student and they are implemented by diffusion of Informatics in the individual subjects (holistic approach). It is an open curriculum where the educator uses ICT according the educational needs and means of the subject area. It defines the minimum knowledge and skills required by the learner by age, in order to be able to use the computer.

Additionally to the existing curricula for the scientific field of Informatics and Technologies, it is stated that Information and Communication Technologies (ICT) are a structural component of modern society and have decisively influenced every aspect of everyday life of the citizen in the fields of administration, economy, education, culture, entertainment, etc. The rapid growth and diffusion of ICT, the huge diversity of digital information available today, combined with the rapid production of new knowledge, form a new social, cultural and educational environment.

In this context, ICT is a key tool for transforming school, supporting and enhancing learning and, ultimately, upgrading the educational outcomes. The new ICT environments radically change the way people access, compile, analyze, represent and present information, communicate and collaborate with each other. They **shape and define new types of skills** that students need to cultivate in their core curricula so they can use ICT **effectively, creatively and ethically correct**. The aim is ICT to enhance learning and to prepare the continuous development of students, aiming at their actively participation in the knowledge society.

Today's school has to prepare effectively the tomorrow's citizen of the Knowledge Society in order to be able to face the challenges and take advantage of the opportunities of the new era. Given that ICT will continue to grow and penetrate the social field at a rapid pace, the New ICT curriculum and computer literacy in Primary School identifies and specifies the dimensions of IT literacy, namely competencies (knowledge, skills, attitudes and values for ICT) that all students need to develop and are necessary in order to continue their studies in secondary education and their further lives. The ultimate goal is for ICT to contribute with new tools and new practices, to improve educational outcomes and ultimately to develop a new school.

### 3.1.4 Other Provisions

#### Horizontal support actions

A helpdesk system is being developed both at a central and at a regional level. Excellence and innovation in the use of ICT by the educational community (awards, competitions, etc.) is being promoted. Small surveys are being conducted to detect the technical and pedagogical conditions for the best integration of ICT at school, as well as to evaluate the experimental and innovative actions. Action is being taken to inform parents, students and teachers regarding internet safety. Educational TV is transformed into a multimedia platform linked to the major social networking sites that provide the educational community with the environment to design and build their own projects (video, online games, social networking services, blogs, twitter, wiki-based projects).

### Provisions of institutional framework and current curricula's adaptations

Modern educational tools, products of information technology, are considered to contribute to the effectiveness of teaching, under the condition that they are used in the appropriate manner and with the appropriate frequency. Wherever it is necessary and feasible, curricula can provide the development of accompanying educational software with clear guidelines for better use. This accompanying material has already been developed and at the time being, all educational community now has access to it through the "Digital School" (it has been described above). The curriculum of almost all subjects includes specific ICT exploitation suggestions and activities combining digital applications, software and learning objects, videos and other contents of digital school as well as photodentro.

### 3.1.5 Rates of ICT Use

It is worth noting that today in Greece 35% of teachers state they have used ICT for their lessons (EU average 74%), 31% of teachers have little or no experience in using ICT (EU average of 7%). 40% of schools have their own website (it is estimated that only 10-15% are active), while only 1.4% of primary and 3.7% of secondary schools have an active website in the Greek School Network http://blogs.sch.gr).

## 3.2 Infrastructures in Primary Schools that Support ICT and Robotics

Several schools have been equipped within the latest 9-10 years and continue to be equipped with interactive boards and portable computer labs while their maintenance/upgrading is carried out at a regular basis. Many schools have acquired their equipment through various projects (e.g. during the pilot period of Unified Reformed Training Program, schools had been equipped with portable computer labs). Many more have been equipped with the help of Parents Associations and various local and national services. A small number of schools have acquired robots because of the initiative either of parents or the school itself. Currently, Greek government has not provided the schools with such equipment.

## 3.3 How is Coding/Robotics/STEM Skills Integrated in the School Curriculum in Greece?

### 3.3.1 Robotics and Educational Robotics

Popular interest in robotics has increased at an astonishing rate in the last several years. The domain of robotics represents a multidisciplinary and highly innovative field encompassing physics, maths, informatics and even industrial design as well as social sciences. Moreover, due to various application domains, teamwork, creativity and entrepreneurial skills are required for the design, programming and innovative exploitation of robots and robotic services.

Learning with educational robotics provides students with opportunities to question and think deeply about technology. When designing, constructing, programming and documenting autonomous robots, students not only learn how technology works, but they also apply the skills and content knowledge learned in school in a meaningful and exciting way. Educational robotics is rich with opportunities to integrate STEM and many other disciplines, including literacy, social studies, dance, music and art, giving students the opportunity to find new ways to work together to foster collaboration skills, express themselves using the technological tool, problem-solving, and think critically and innovatively. Educational robotics is a learning tool that enhances student experience through hands-on mind-on learning. Most importantly, educational robotics provides a fun and exciting learning environment because of its hands-on nature and the integration of technology. Children are fascinated by such autonomous machines. This fascination and the variety of fields and topics covered make robotics a powerful idea to engage with. Young girls as well as boys can easily connect robots to their personal interests and share their ideas through these tangible artifacts (Alimisis, Moro & Menegatti; 2017).

Educational robotics has become quite popular in recent years for various reasons. Besides the fascination of robots on children and the working parents' need to have children occupied during school holidays, robotics is different from other modes of learning because by being a multi-disciplinary field it involves more subject areas than other motivating contexts (Johnson, 2003). There are already many successful approaches in educational robotics in Europe and worldwide. Most of these approaches are outside of schools, defragmented and unconnected. In schools, on the other hand, computers, tablets and other technologies have been introduced to classrooms. However, these technologies have not been correctly integrated in the schools' curriculum to improve the learning process (Schleicher, 2015). Consequently, there are many different activities offered in the context of educational robotics ranging from workshops and competitions to conferences.

### 3.3.2 Educational Robotics: The Context in and Outside of Schools

In the last two decades, robots have started their incursion into the schools. Although diverse researchers have pointed out their benefits in schools, the slow pace of their introduction is partially justified by the cost of the kits and the schools' different priorities in accessing technology. Recently, the cost of kits has decreased, the capability offered by the electronic components has increased (Miller, 2014), and availability of support materials and software for robotic kits has improved (Alimisis, 2013). With these benefits, educational robotics kits are more appealing to schools. As a result, organizations offering educational robotics invest in the creation of different learning activities around these kits to employ in and outside of schools.

The main theories behind Educational Robotics are constructivism and constructionism. Piaget argues that manipulating artefacts is a key for children to construct their knowledge (Piaget, 1974). Papert added the idea that knowledge construction happens effectively in a context where the learner is consciously engaged in constructing a public entity (Papert, 1980). Teachers' role is to offer opportunities for children to engage in hands-on explorations and to provide tools for children to construct knowledge in the classroom environment. Educational Robotics creates a learning environment in which children can interact with their environment and work with real-world problems; in this sense Educational Robotics can be a great tool for children to have constructionist learning experiences. Studies in the field (e.g. Eguchi, 2010; Benitti, 2012) report that robotics has a potential impact on student's learning in different subject areas (Physics, Mathematics, Engineering, Informatics and more) and on personal development including cognitive, meta-cognitive and social skills, such as: research skills, creative thinking, decision making, problem solving, communication and team working skills, all of them being essential skills necessary in the workplace of the 21st century (Lammer et al, 2017).

Teachers are generally interested in educational robotics activities as the latter represent an interesting and exciting alternative over the conventional teaching lessons. They certainly welcome any opportunity of having an IT colleague to perform such activities within the frame of their lesson under, the condition that the teachers themselves can outline the semester syllabus. Yet, workshops regarding robotics are almost impossible to be held without the assistance of experts outside the schools both in primary and secondary education.

Lack of technical knowledge represents a major hindering factor for the success of train-the trainer workshops, as the teachers don't reach real confidence in what they learned. Such as the Teaching Profession in Europe (Commission/EACEA/Eurydice, 2015) report compiles about teachers' needs: "They are specially concerned with needs under the headings of 'teaching students with special need', 'ICT skills for teaching', 'new technologies in the workplace', 'approaches to individualized learning' and 'teaching cross-curricular skills." This shows that teachers' main concern is to acquire the necessary skills in order to use technology rather than the required knowledge to teach their subjects.

Three different approaches to Educational Robotics are reported in the literature (Eguchi, 2010):

- Theme-Based Curriculum Approach: curriculum areas are integrated around a special topic for learning and studied mostly through inquiry and communication (e.g. Litinas &Alimisis, 2013)
- Project-Based Approach: students work in groups to explore real-world problems; this is for example the case proposed in the methodology developed by the European project TERECoP, Teacher Education in Robotics-enhanced Constructivist Pedagogical Methods, www.terecop.eu).
- Goal-Oriented Approach: children compete in challenges in Robotics Tournaments taking place mostly out of school, such as FIRST Lego League (http://www.firstlegoleague.org), World Robotics Olympiad in Greece (http://wrohellas.gr) and more.

At the same time there is an increasing number of actions and events in Greece that might be categorized in thematic workshops, regional conferences, regional or national tournaments, training courses for teachers, local or regional networks and more. On the other hand, there is no systematic introduction of robotics in school curricula within the Greek school system. However, a plethora of constructionist robotic toolkits created and deployed in the 2000s with improved and friendlier designs (LEGO Mindstorms NXT, Arduino and more) have made robotics popular among students of all ages. Pioneering efforts in school classes during last decade have shown that children are enthusiastically involved in robotics projects achieving learning goals and/or developing new skills (e.g. Detsikas & Alimisis, 2011; Litinas &Alimisis, 2013).

Our research for the National Report is structured into good practices focusing on educational robotics. The main findings from the review show that educational robotics can increase students' engagement and interest in STEM subjects, with some literature specifically focusing on girls. Additionally, some research also examined students' 21st Century Skills.

### 3.3.3 Robotics Education in Primary Schools Curriculum

Robotic education is not a teaching subject in Greek public primary school. Teachers however, apply educational robotics activities and integrate them in their teaching driven from their personal interest and knowledge of the subject.

Nevertheless, there is reference to Robotics in the new curriculum for computer science in Primary Education which is taught by an IT teacher as a distinct subject in all classes of elementary school for 1 teaching hour. Learning objectives include "Modeling with conceptual charts" and "Programming the computer", while at the same time, concepts

of Robotics are presented in the individual modules of the curriculum for 5th and 6th grade as well.
To be more specific, in 5th grade the module "Programming the Computer" which is taught for 10 teaching hours, gradually familiarize students with programming through the use of available visual environments. Students in appropriate educational programming environments handle and explore ready-made programs and are introduced into the concept of algorithm, having as a general orientation the transition from digital painting to programmable multimedia. The teacher stimulates students' interest in creating small applications that cause objects to act on the scene or in the viewing area, using controllers (keyboard, mouse).
The expected learning effects for the pupils according the official curriculum are to:

1. Be able to recognize the basic components of an educational environment in visual programming
2. Execute ready-made programs that will be given to him
3. Verbally describe the steps of simple algorithms required to implement in the visual programming educational environment
4. Make simple commands in the visual programming environment
5. Define actions and scenarios to be performed to achieve desirable events
6. Explain why an object of the programming environment behaves in a specific way
7. Encode an algorithm in a programming environment and develop small applications using an educational programming environment in order to analyze a problem in a simpler one
8. Synthesize a project from its individual components (resulting from the analysis)
9. To distinguish different events in a visual programming environment
10. Get familiarized with error correction techniques and optimization of programs that develop an educational programming environment
11. Create complex projects from individual simpler projects

## a. “Programming the Computer"-5th grade

### Activities

Indicatively the activities to take place during the teaching procedure of the module "Programming the Computer" in the 5th grade of the primary school, could include:

- Role-play, aiming at introducing students to programming (logic of turtle geometry, stringency of ordering, etc.), where one student plays the role of the turtle (the robot) and another is the programmer who directs him inside the classroom using commands like “Forward”, “Left”, “Right”.

The teacher presents the programming environment to the students initially as an extension of the painting program. They design simple shapes by executing appropriate commands. Then they are asked to draw letters of the alphabet such as I, C, P, X, T, E, H. They constantly plan on the paper the steps that need to be made, study the coding errors and correct them. Subsequently, students modify their programs by designing the above shapes with different characteristics (color, line thickness, etc.). Afterwards, the teacher discusses with the students about the points in the algorithms they designed and elaborate on how some of these algorithms could be used again.

- Design complex shapes, after having analyzed them in simpler geometric shapes.

The actions taken for such projects could:

- Consider a square as the composition of four rectilinear segments (linear motion and rotation 90o)
- Refer to a house as the composition of a rectangle and a triangle
- A tree could be the composition of a rectangle and a circle (ellipse)
- A ladder may be the composition of successive C

### Suggested teaching time

10 hours

### Educational material

The proposed educational material to be used for the module "Programming the Computer" can include “Educational optic programming environments”, “Algorithm Simulations”, “EasyLogo”, “Scratch”, “BYOB”, “Kodu”, “Microworlds Pro”, “GameMaker”, “K-Turtle”, “Turtle Art”, “OpenStarlogo” and “Educational Robotics”.

## b. "Programming the Computer"-6th grade

"Programming My Computer" continues to be taught in the 6th grade of the primary education, with a spiral approach this year. The teaching time is twelve (12) hours.

### Activities

Students, according to the curriculum, implement appropriate activities to expand and enhance their programming skills. The aim is to approach knowledge, cooperation, self-action, development of creativity and imagination through their active participation.

Previous applications highlight the need to re-use a command segment, as well as to repeat the commands learned in the previous class.

- Students are encouraged to analyze again shapes in simpler ones, as well as to identify and correct mistakes in their programs.

As an example we can refer to the:

1. Creation of a train with a composition of wagons where each wagon is a rectangle with two circular wheels
2. Painting of simple geometric shapes in different sizes and colors

3. Construction of a windmill in motion as a composition of a rectangle, a triangle and a line
4. Programming of the movement of an object (eg ball) in a space or a labyrinth
5. Development of interactive games and stories

#### Suggested teaching time

12 hours

#### Educational material

In accordance with the official curriculum, java applets and flash animations can be used to help pupils reflect on how to come up with the steps required to solve a problem, as well as to help them design these steps in the programming environment.

- Furthermore, educational robotics is included, where students in groups of 3-4 people, plan and organize their work, getting familiarized with the tools of the educational robotics environment.

As an example we can refer to the assemblage of a robot: design, implement, control and improve simple and complex robot guidance algorithms.

## 3.4 Other European/National Projects Relevant to the Scope of the Project (Educational Robotics: Good Practices in Greece)

### 3.4.1 Educational Robotics Projects

#### TERECOP

An interesting project about Educational Robotics is the European project TERECOP (Teacher Education on Robotics-Enhanced Constructivist Pedagogical Methods) (European), which took place from 2006 to 2009. The project is based on constructivist and constructionist pedagogical theories and the main theory adopted for the project's theoretical frame was the socio-constructivist approach. The overall aim of the project was to develop a framework for teacher education courses in order to enable teachers to implement the robotics-enhanced constructivist learning in school classrooms, and report experiences from the implementation of this framework. The project leads to several papers and events about teacher Education on Robotics and about the implementation of the educational framework. This framework can be very helpful in designing activity plans and new curriculums that enhance STEM and Educational Robotics education.

### R4STEM

ER4STEM project is refine, unify and enhance current European approaches to STEM education through robotics in one open operational and conceptual framework.
The concept is founded on three important pillars of constructionism:

1. Engaging with powerful ideas,
2. Building on personal interests,
3. Learning through making (or presenting ideas with tangible artifacts).

The ER4STEM framework is offer students aged 7 to 18 as well as their educators' different perspectives and approaches to find their interests and strengths in robotics to pursue STEM careers through robotics and semi-autonomous smart devices. At the same time students will learn about technology (e.g. circuits), about a domain (e.g. math) and acquire skills (e.g. collaborating, coding). Innovative approaches will be developed to achieve an integrated and consistent concept that picks children up at different ages, beginning in primary school and accompanies them until graduation from secondary school (Lammer et al, 2017).

## 3.4.2 Educational Robotics Workshops and Competitions

### UoM Robotics Academy

The UoM Robotics Academy was founded in the vision to transfer the results of international research and emerging Robotics programs to society. The ultimate goals concern the Social Robotics and the Educational Robotics. In specific, for the field of social robotics to increase the applicability of robots in cases like companion and emotional attachment for individual support, tools for interventions at Special needs, services in the sector of Health, inclusion and support for elderly, etc. and for the field of Educational Robotics to acquire learning in an experiential and playful way and inspire everlasting love for learning.
The Robotics Academy started as a program at the Educational and Social Policy Department, University of Macedonia, Greece. After 15 years practicing of its members in delivering activities in schools, museums, informal education, entertainment venues and research institutions in Greece and abroad, UoM Robotics Academy acquired its legal status on September 2015.
As a recipient of proposals and ideas from organizations and individuals interested in integrating research findings in educational tools and based on the experience acquired in developing training and educational tools over the years, the Robotics Academy was created to combine learning with play, to transform education in a constructive explorative playful process.

### EduACT

EduACT (Education T. O., 2016) is a volunteer group of young entrepreneurs, scientists, IT experts and pedagogues from Thessaloniki, Greece. Between other projects, eduAct organizes the FIRST LEGO League (FFL) in Greece, a robot competition for children aged from 10 to 16 years old. FIRST® LEGO® League (FLL) is a program that supports children and youngsters in order to introduce them to science and technology in a sporty atmosphere.

The basis of FLL is a robotics tournament, where kids and youngsters need to solve a tricky "mission" with the help of a robot. The kids are researching a given topic within a team and they are planning, programming and testing an autonomous robot to solve the mission.

The FLL project according to eduAct's website, aims to a national contribution for the teaching of science, mathematics and technology in and out of the school environment, through a game-like academic competition that gives students a chance for innovation and creativity, and at the same time inspires children and young people to think like scientists and engineers.

Apart from the FFL competition, eduAct also organizes a summer camp for robotics. This was the first "Robotic Camp" in Greece for children around the world. In the Camp, children are cooperating in a team in order to create their robots, with famous robot designers from all over the world giving their support and inspiration.

Finally, eduAct organizes a series of workshops for robotics where students from all ages are learning about robots and make their own creative constructions. Every workshop consists of a small group of 10-12 persons and it takes place in 8 meetings of one hour each. The goals of the workshop, as mentioned from eduAct, are:

- To develop a mathematically competent and technological literate workforce
- To influence children to become interested in robotics and related technologies as an area of study and future employment
- To grow future entrepreneurs and employees for the nation
- To enable kids having fun while experimenting with science and technology

### RobotixLab

RobotixLab (Robotixlab, 2016) applies innovation in the area of creative robotics applications, design and prototype development of an educational robot kit design and production of electronics and making kits for education and more. RobotixLab designs and runs custom made workshops based on the age range of the group (starting from 6-7) with small groups of 15 people working in teams of 2-3 persons. Workshops are organized with a project-based approach and the main goal is to help participants acquire an open innovative thinking mindset, learn how to cooperate and be part of a team, take responsibilities, brainstorm and tackle a problem in a lateral thinking way, test, evaluate and redesign their ideas in an iterative optimization design cycle. The main areas of workshops are: Robotics, Electronics, modeling-3D printing, Videography, innovative entrepreneurship and game design. Robotics workshops range from small 3 to 4, 90 minutes sessions to long 25 to 30, 90 minutes sessions and they are based on theme scenarios and challenges like robot recyclers to save the environment, maze solving robots in Theseas and Minotaur adventure and interactive robots that produce art. During a RobotixLab workshop participants build robots based on the theme scenario by either following clear, step by step instructions (for beginners) or brainstorm design and build their very own device (for intermediate to advanced participants).

### WRO (World Robot Olympiad) Hellas

One of the most famous competitions for educational robotics in Greece is the WRO (World Robot Olympiad) Hellas, which is a membership of the World Robot Olympiad organization. WRO Hellas organizes yearly a national competition for robotics, since 2009.

The competition involves students from any Greek school or university, with the age range being between 6 to 25 years. Every competition has a few challenges for different age groups: one for Elementary school students (6 – 12 years old), one for Middle School students (13-15 years old) years old, one for High School students (16-19 years old) and one for University students (17 – 25 years old). There is also one extra special challenge with the age group usually being between 10 and 19 years old.

Every challenge has a theme (e.g. Bowling Game, Treasure Hunt) and the students are called to assemble and program a robot in order to do a specific action (e.g. cross walk on a colored path). The basic material that is used from the students (based on the last competition) includes Lego Mindstorms sets (NXT or EV3) and some high-tech color sensors. Sometimes there are also Arduino and Raspberry microprocessors in some categories. The competition consists of several rounds: assembly time, programming and testing time, in total 150 minutes. Also, all the challenges are team-based, and every team consists of one coach (minimum age 20) and two or three team members. From pedagogical point of view, we could say that the students are engaged with educational robotics in a project based and collaborative learning context.

### The AegeanRobotics team

The AegeanRobotics team from the Polytechnic University of the Aegean School supported by the Artificial Intelligence Laboratory of the Department of Information and Communication Systems. Founded in 2013 and currently consists of the University faculty, doctoral students, graduate and undergraduate students.

The group has organized four robotic schools in Samos and educational seminars in four Greek islands of the university (Samos, Chios, Syros, Lesvos). Organizes seminars remote robotics and new technologies and is actively participating in conferences and exhibitions which presents the project. The group has taken part in three international competitions and organized one in collaboration with the Mexican Federation of

Robotics. Since 2017 organizes the National Competition educational robotics Aegean Robotics Competition.

### Robotex

Robotex is the world's largest series of robotics festival. It currently runs in 10+ countries, and it is on way to making it 20+ by 2021. It attracts tens of thousands of visitors, from almost 50 different countries. They are bringing the festival to Athens, Greece in 2019, for the first time. Competitions are the heart of the festival, and they provide rhythm and fun for the whole family. They are based on internationally accepted standards, and thus offer the opportunity for open competition. Workshops are a great chance for kids, youth, their parents and other visitors to learn more about robotics, and related technologies. The workshops are practical and cater to all ages. Researchers, engineers, and business peoples share their insights and experience with the public in relevant presentations and discussions and exhibition is a wonderful opportunity for visitors to see robots and other creations, and to talk to the people and teams who design and make them.

# 4. Empirical Research - Statistics

## 4.1 Description of the Questionnaires

For the survey that took place as part of Intellectual Output 1 in the framework of the CodeSkills4Robotics project, the Consortium decided to create and distribute two questionnaires electronically using Google Forms. The questionnaires' aim was to map the digital skills, challenges, mismatches and gaps of primary school students (pupils) in the field of Educational Robotics and the digital needs, requirements and other opportunities for training of primary school teachers in this field as well as in the field of STEM.

Two types of questionnaires were distributed. The one concerned active primary school teachers and the other concerned primary school pupils. Closed type questions were used in both questionnaires, such as single and multiple-choice questions.

The survey's target group consists of active primary school teachers as well as primary school pupils aged from 9 to 12 years old.

A total of 160 teachers and 439 pupils, participated in the survey. The questionnaires were distributed to each partner country through available media. In Greece, in particular, the National Center of Scientific Research "Demokritos", which is the largest multidisciplinary Research Center in Greece, has a large number of contacts, which include universities, institutions, public schools and educators, as well as students, due to the educational activities it organizes. In this way, it was easy to communicate the survey via e-mail. The results were analyzed by descriptive statistics. The results are presented in graphs in Annex A and Annex B, for the teachers and pupils survey accordingly.

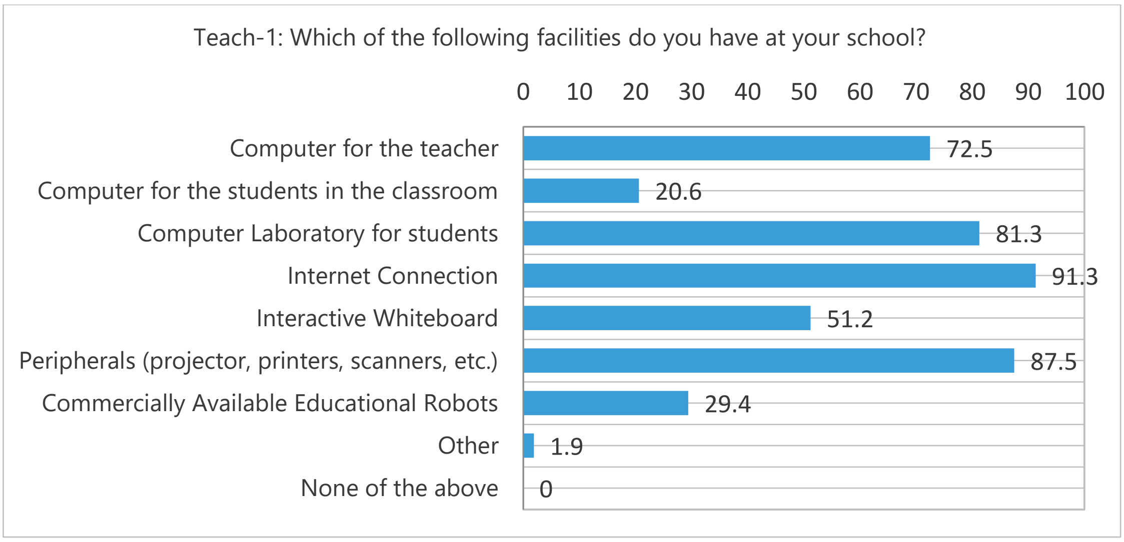
## 4.2 Survey for Teachers

Out of 160 teachers, 116 were female, and the rest (44) were male. 42,5% of them are aged between 25 and 35 years old, the 30% is from 46 to 55, the 25% is between 36 to 45 and a small percentage is above 56 years of age.

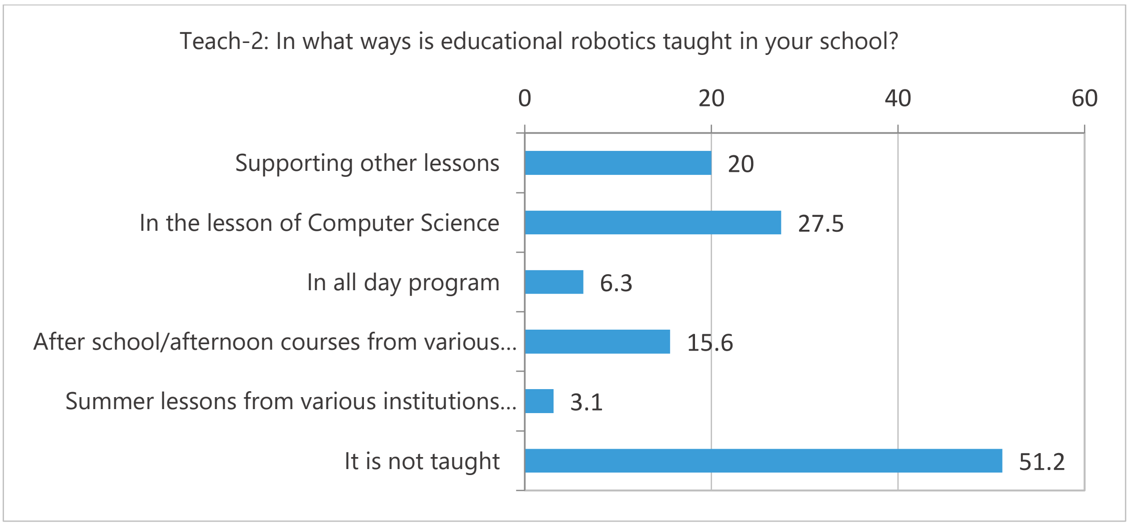
The results about the years of services agree with the above age distribution, as 38,8% work as teachers for 1 to 10 years, 39,4% for 11 to 20 years and the smallest percentage of 21,9% more than 20 years, which is reasonable if we think that a smaller part of the total teachers' sample is above 46 years old.

The majority of teachers claim to work in an urban center (109 out of 160) and 51 of them work in a provincial school.

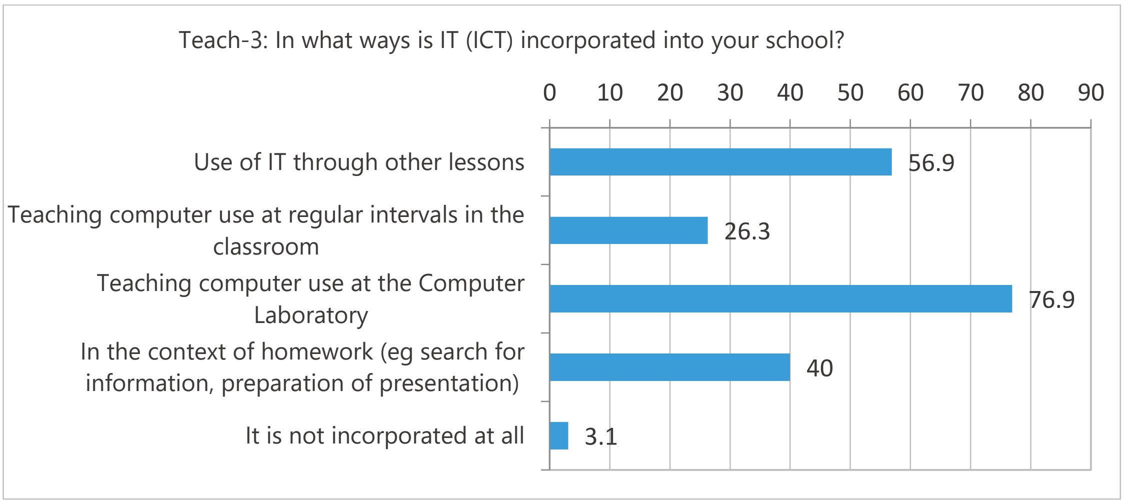
As far as technological infrastructure is concerned, the vast majority of teachers answered that they have access to the Internet (91,3%), to peripherals (such as projectors, printers, scanners, etc.) (87,5%), to computer laboratories for students (81,3%) and to computers for teachers (72,5%) in their school. Half of the educators, allege that their school owns an interactive board, but only 29,4% have available commercially educational robots and 20,6% answered that computers are available for the students in the classroom (Teach-1).



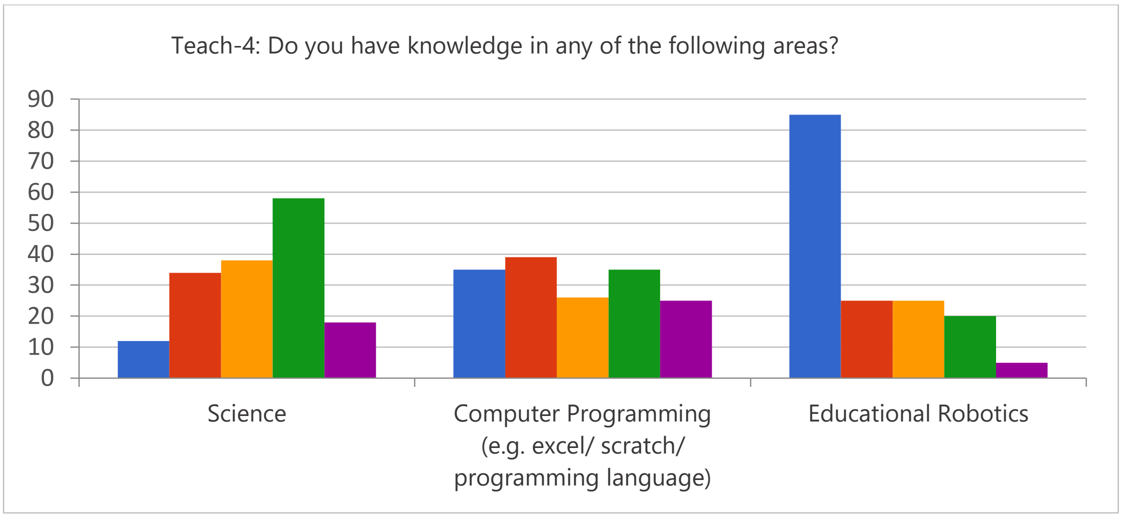

According to the results, educational robotics is either not taught in schools (51,4%) or it is taught by supporting other lessons (20%), such as Computer Science (27,5%), or in after school, afternoon courses from various institutions (15,6%) (Teach-2).



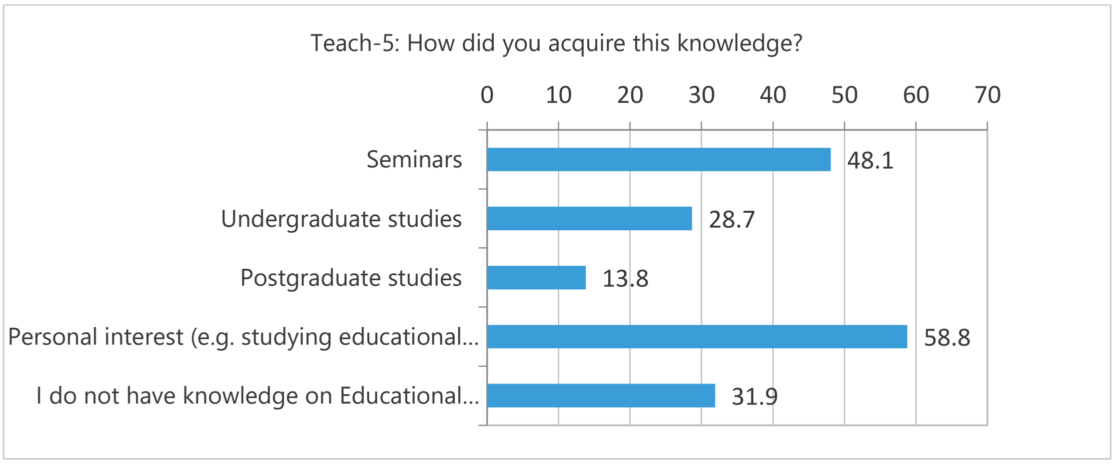

In addition, most of the teachers (76,9%) claim that IT is incorporated in their schools through teaching computer use at the Computer Laboratory and more than half of them (56.9%) answered that ICTs are integrated though the use of IT in other lessons. Moreover, the percentage of teachers who believe that ICTs are incorporated in schools in the context of homework (searching for information, preparing for a presentation, etc.) is not negligible (40%) (Teach-3).



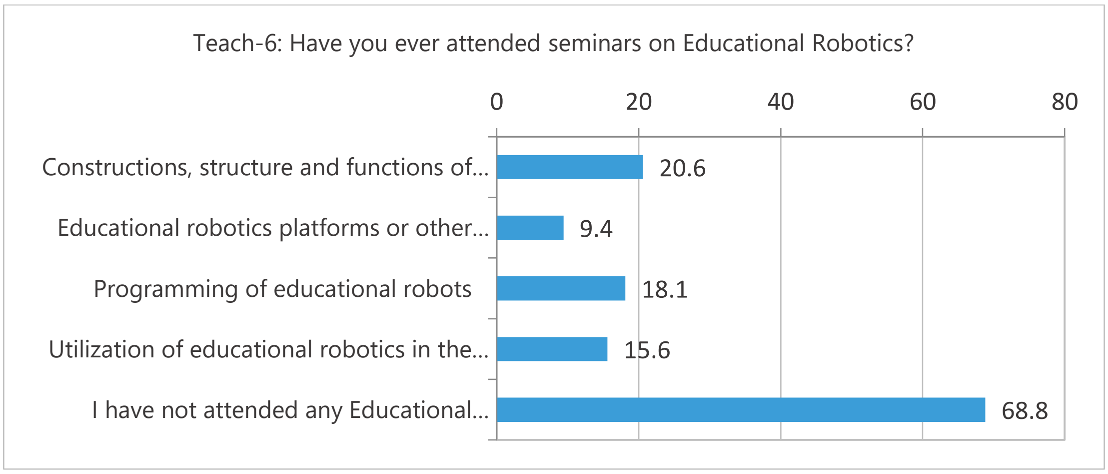

Reaching the section about the knowledge of STEM and Educational Robotics, the results were somewhat disappointing, concerning the latter. More than half of the teachers (85 out of 160) were ignorant about the Educational Robotics sector, but a significant number of them has knowledge of Science. Results regarding Computer Programming indicate that most of the teachers are ignorant or know little about the field. Only 60 out of 160 are aware of the field (Teach-4).

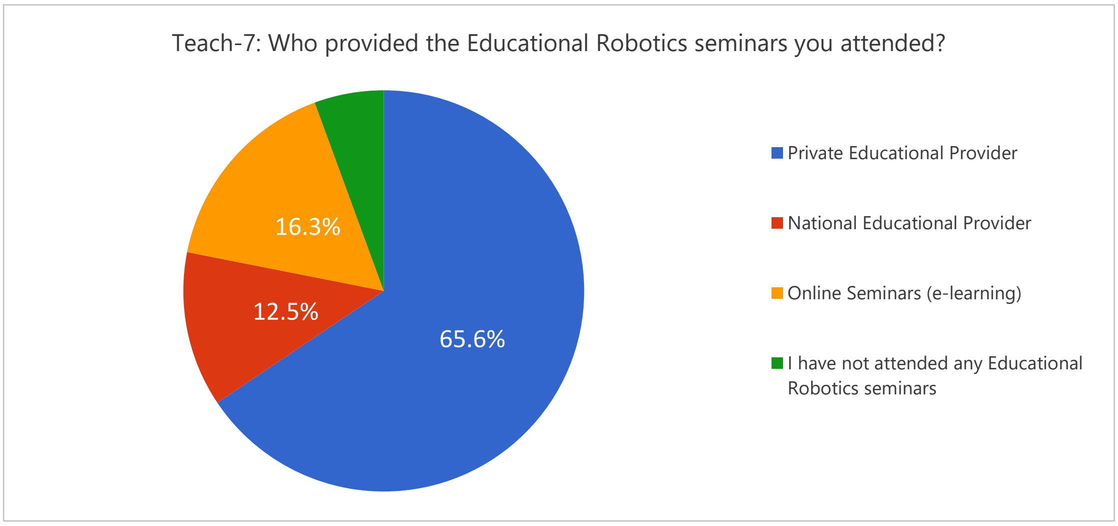



The above knowledge is mostly acquired through personal interest (e.g. studying educational material available online) or seminars. Some answered that they learned about Sciences and Computer Programming through their studies (undergraduate or postgraduate) and a great number of teachers (31,9%) answered that they did not have knowledge of Educational Robotics (Teach-5).

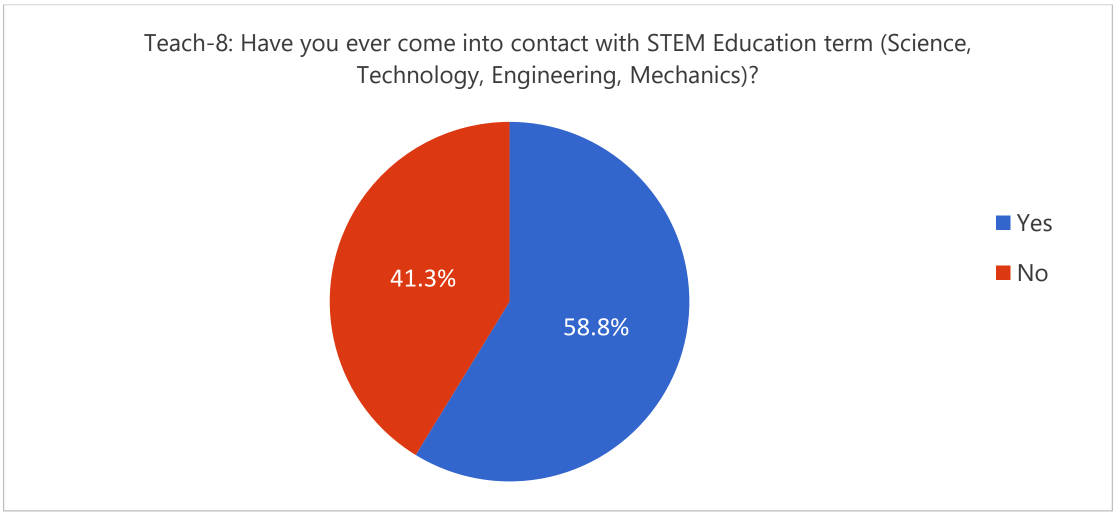


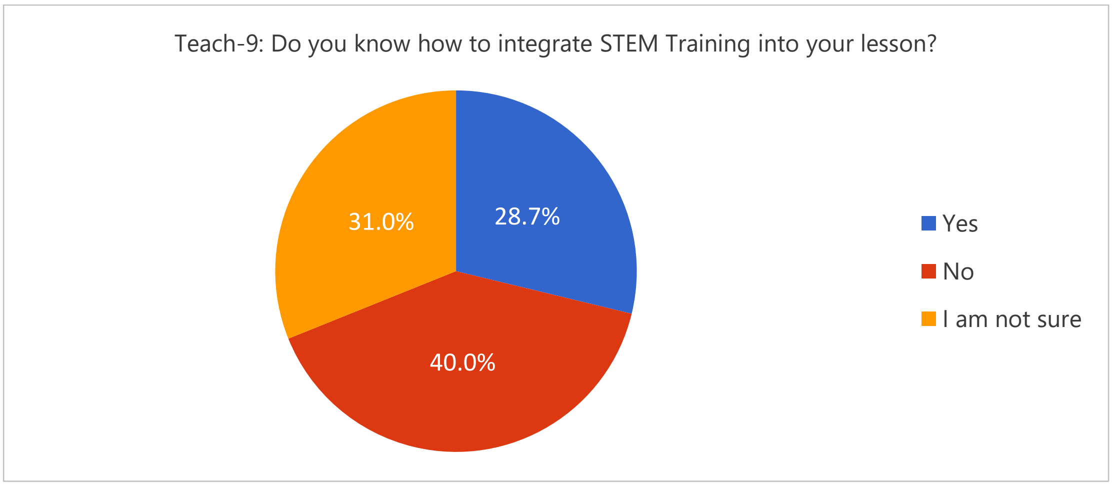

The majority of the participants (110 out of 160), has not attended any Educational Robotics seminar, a result which was expected, if we take the previous question into consideration. While, one fifth of the educators (20,6%), has taken part in seminars about constructions, structure and functions of educational robots and another fifth (18,1%) has attended seminars about programming educational robots, only 15,6% has utilized educational robotics in the education process. A much smaller number of participants (15 out of 160), has attended a seminar concerning educational robotics platforms or other environments (Teach-6). Some of the aforementioned seminars were provided online (e-learning) (16,3%), some by a national educational provider (12,5%) and a small amount by private education providers (5,6%) (Teach-7).



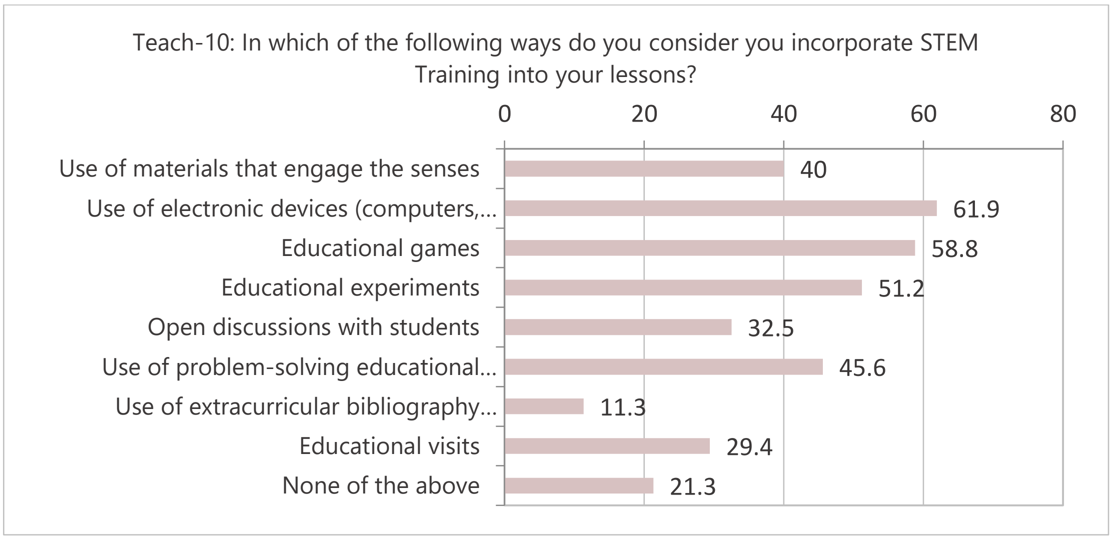



Regarding the STEM education term, only 58,8% of the participants are familiar with it (Teach-8). The majority of those who are aware of the term does not know (40%) or is not sure (31,3%) how to integrate STEM training into their lesson. The rest 28,7% claim that they know how to accomplish that (Teach-9).

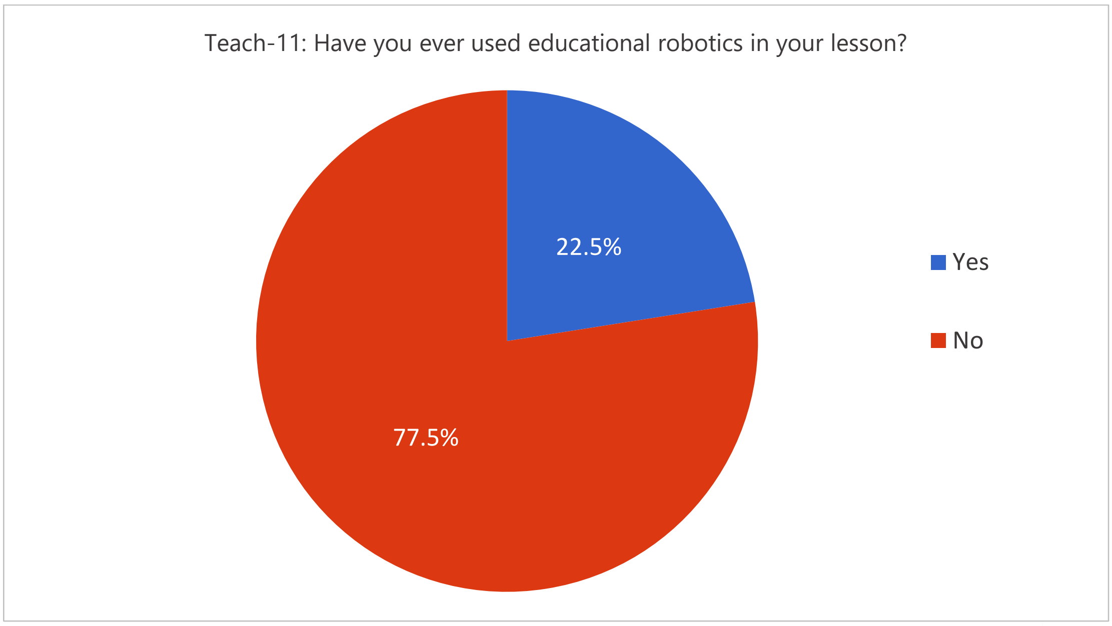


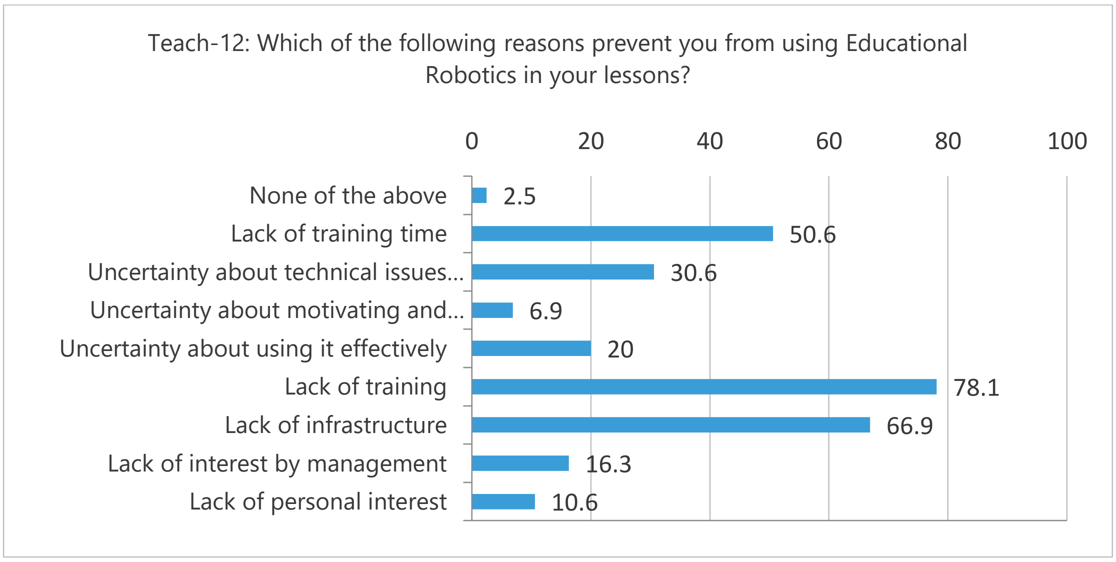



When it comes to specific ways for incorporating STEM Training into the lessons, most of the participants think it can be accomplished through the use of electronic devices (computers, tablets, etc.) (61,9%), through educational games (58,8%) and through educational experiments (51,2%). Less than half of our sample teachers believe that the term STEM can be integrated in classrooms through the use of problem-solving educational approach (45,6%), through the use of materials that engage the senses (40%) or through open discussions with students (32,5%). Few of the participants believe that STEM education can be incorporated in lessons through educational visits (29,4%) or through the use of extracurricular bibliography (11,3%) (Teach-10).

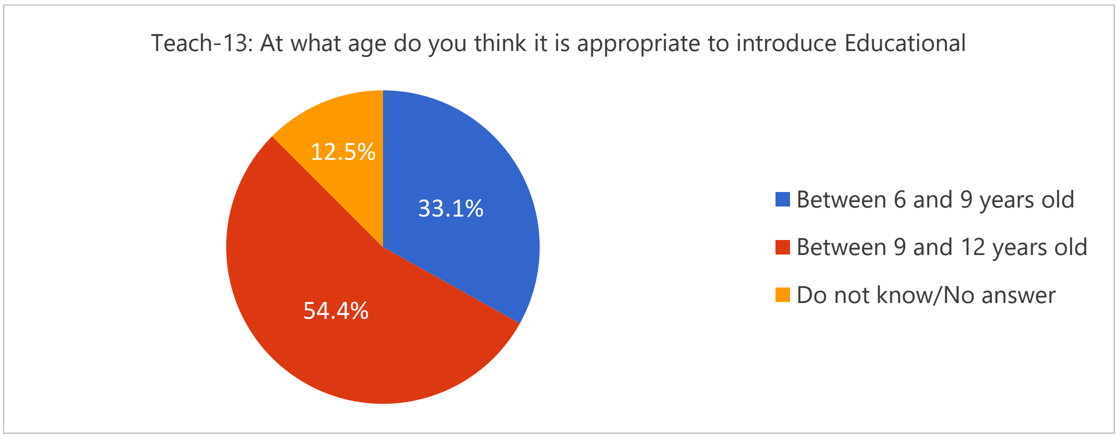



Most of the participants in the survey have not used educational robotics in their lesson (124 out of 160) (Teach-11). The main reason, preventing them from doing so is claimed to be the lack of training in that matter (78,1%), followed by the lack of infrastructure (66,9%). 50,6% of the participants agreed that the lack of training time contributes to this (Teach-12).

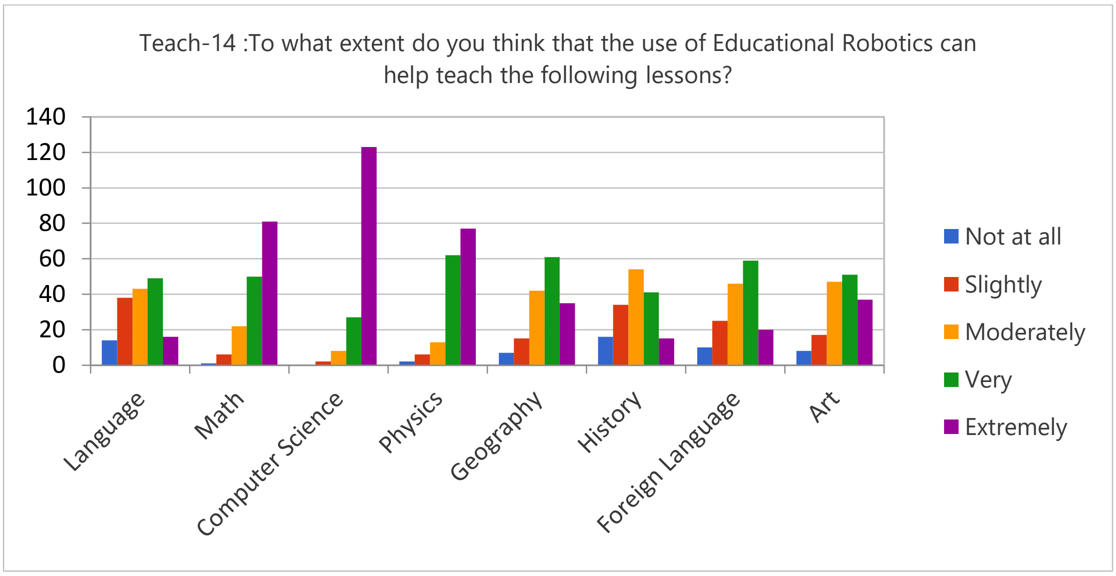




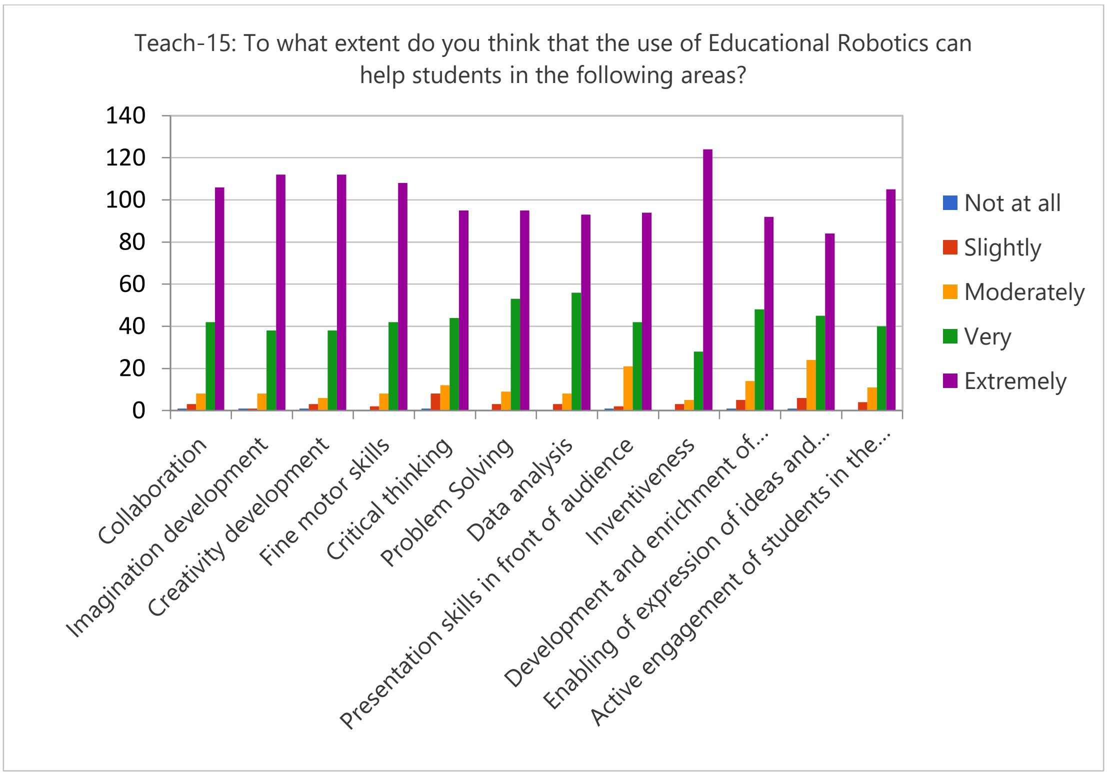

Almost half of the teachers (54,4%) believed that the appropriate age span to introduce educational robotics in the class is from 9 to 12 years old, which is in accordance with our proposal in this project. However, one third of the educators (33,1%) think it would be more appropriate to start from the age of 6 to 9 years old (Teach-13).



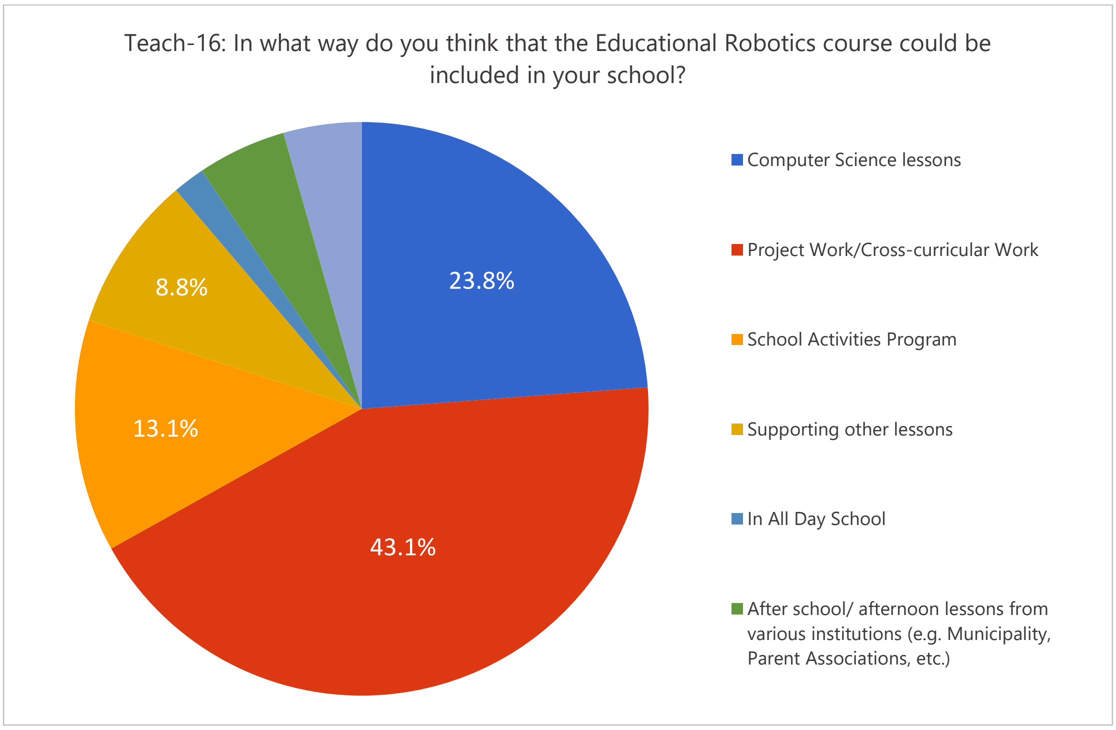

The subjects, which were considered to be more favored by the use of educational robotics, were Computer Science, Math, Physics, Geography, Foreign Languages and Art. As for the least favored, History and Language were chosen by the participants (Teach-14).



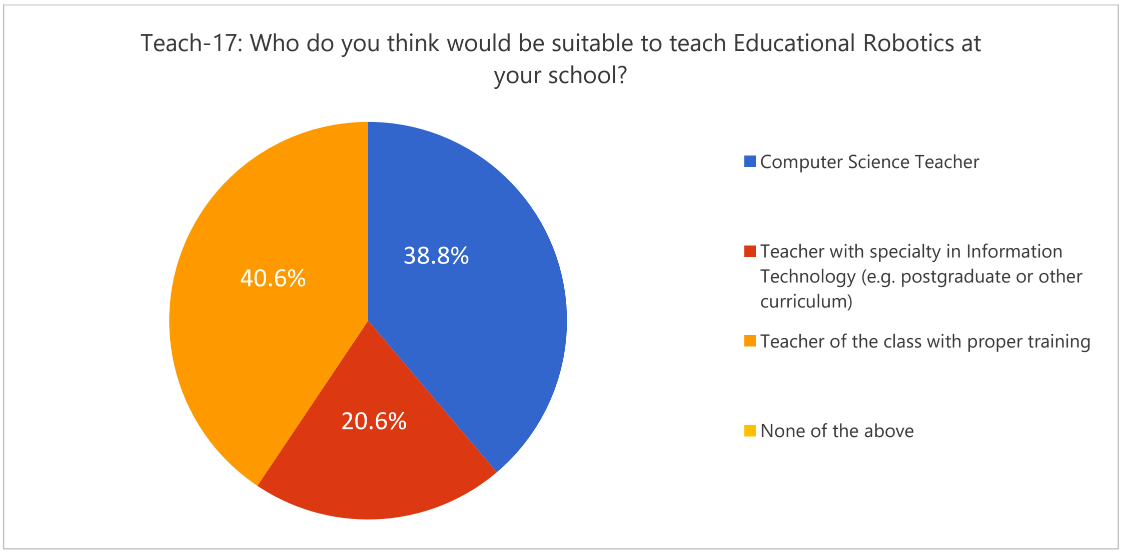

When it comes to the extent of help that Educational Robotics can offer to pupils, all the areas mentioned were considered as extremely helpful. The areas, which are considered to be developed are the following: inventiveness, imagination, creativity, fine motor skills, data analysis, collaboration, problem solving, active engagement of students in the learning process, learning strategies, critical thinking, presentation skills in front of an audience, expression of ideas and opinions (Teach-15).




According to the Teachers, educational Robotics is more likely to be included in school through project and cross-curricular works (43,1%). Another way considered for this purpose is through the Computer Science lessons (23,8%) or through the school activities program (13,1%) (Teach-16).




The vast majority of the teachers (93,1%) would like to use Educational Robotics in order to teach STEM skills. 61,2% of the participants believe that a teacher with proper training or a specialty in Information Technology, would be more suitable in comparison to the rest 38,8%, who support that the Computer Science Teacher is more suitable for the job (Teach-17).



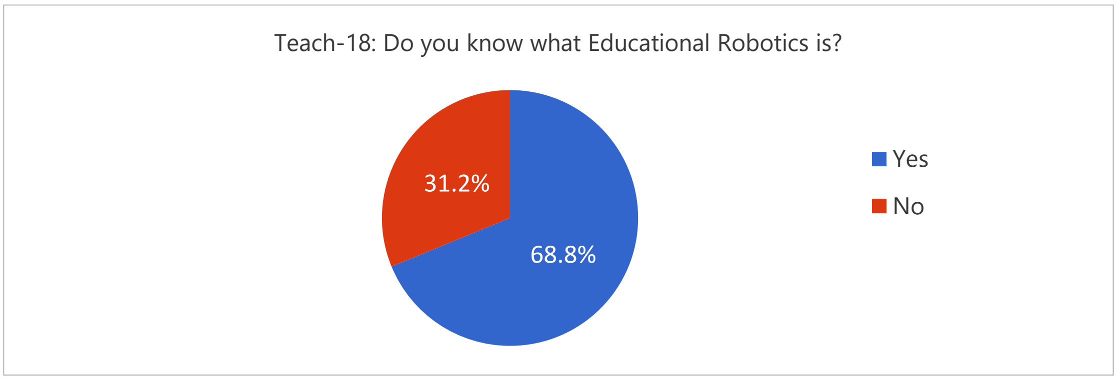

To summarize, a high proportion of teachers does not have knowledge of the STEM education term or of the ways to include it in their class. However, the majority of the educators is only informed about two of the pillars of STEM education, namely Science and Technology, but not about Engineering and Mechanics. They acquired this knowledge mostly through actions of personal interest and seminars.

At the same time, most of teachers have not been trained, nor have they attended any seminars about Educational Robotics. Any obtained knowledge is a product of personal interest and e-learning. Despite their ignorance of this field, they appreciate its value and its probable impact to the areas of inventiveness, imagination, creativity and many others, and are more than willing to use Robotics in order to teach STEM skills.

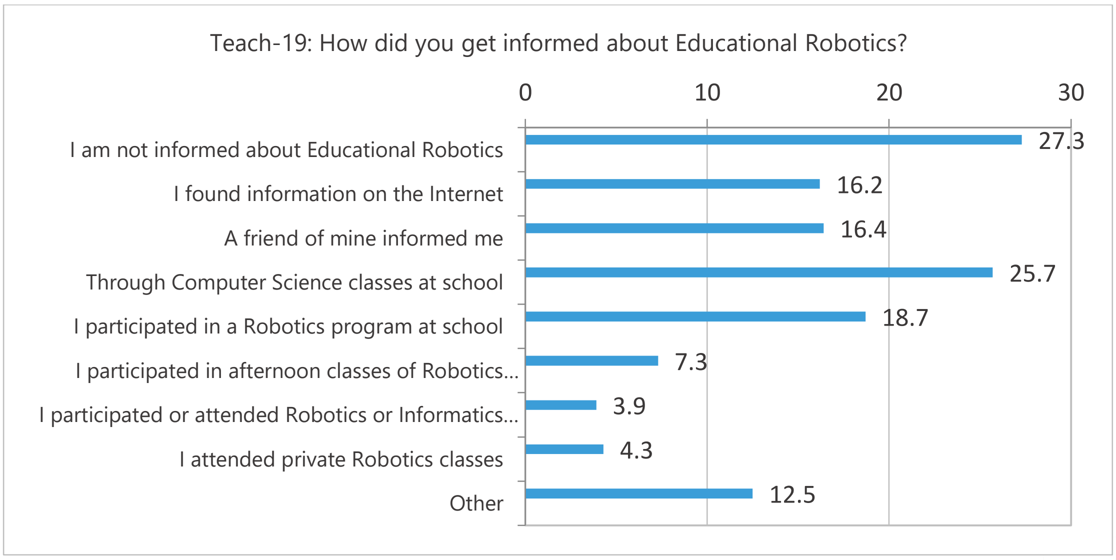
### 4.3 Survey for Students

In this survey, a total of 439 students answered the questionnaire, who were almost equally separated into boys (51,3%) and girls (48,7%). The ages varied from 8 to 9 years old (28,7%), from 10 to 11 (39,4%) and the rest from 12 to 13 years of age (31,9%). The vast majority of the participants is living in an urban center (382 out of 439) and the rest 57 live in the province.

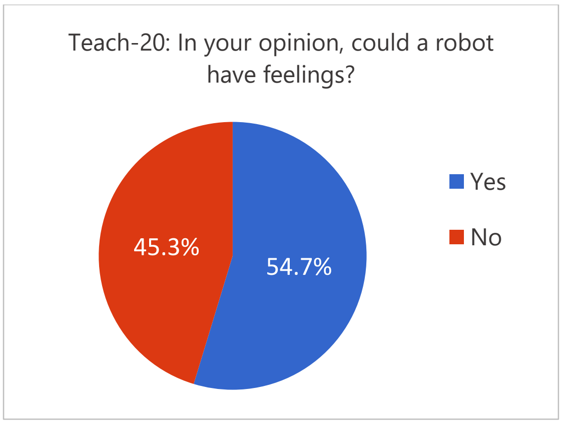
In contrast with the teachers' answers, most students claim to know what Educational Robotics is about. Only, 31,2% of the students answered they did not have knowledge of the Educational Robotics term (Teach-18).

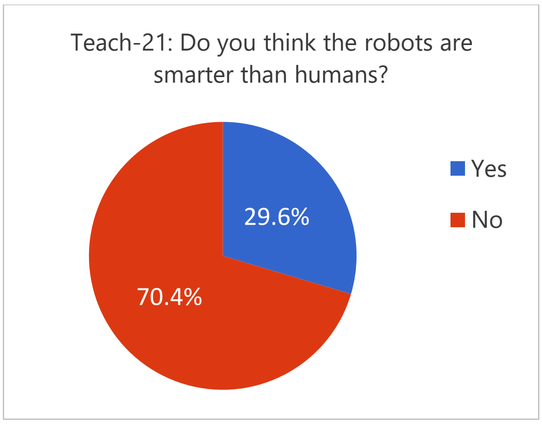


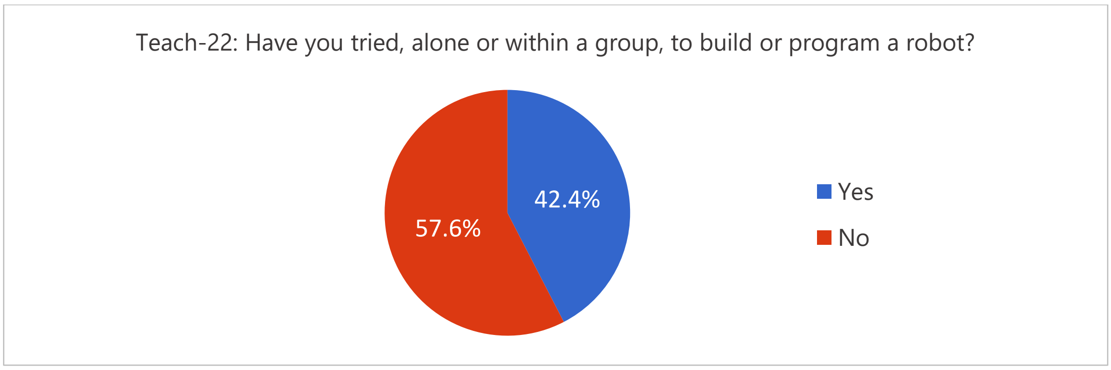

More than 25% of the participants, who knew about Educational Robotics, were informed through the Computer Science classes at school. 18,7% of the students participated in a Robotics program at school, 16,2% found information about Robotics on the Internet and 16,4% was informed through a friend (Teach-19).



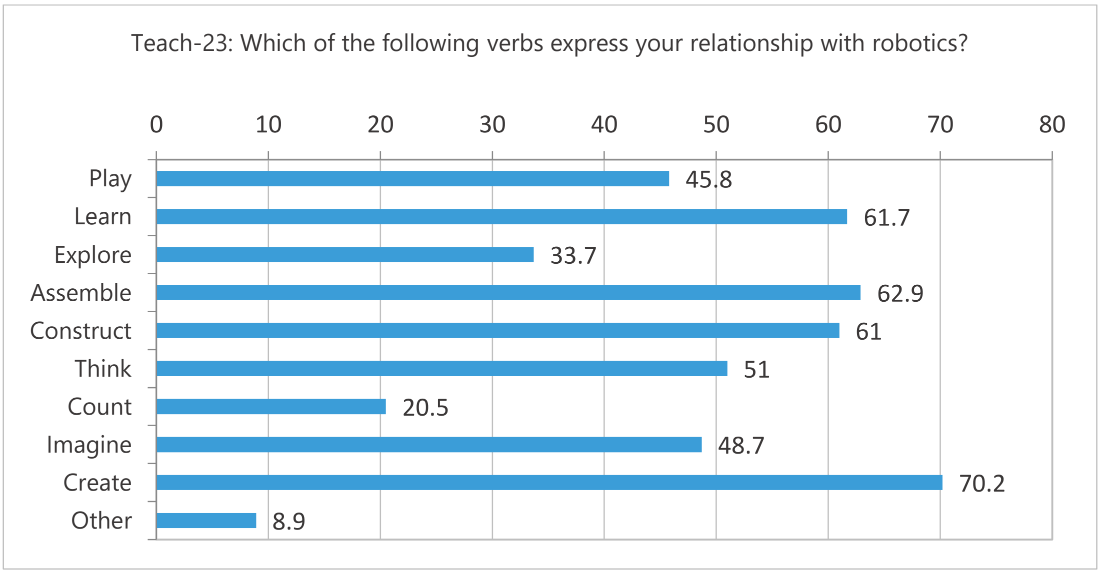
Most of the students seem to be very interested in Robotics (370 out of 439). The majority would like to possess a robot and also declared that they are not afraid of them (413 out of 439). Opinions seem to differ when it comes to the children's opinion about whether or not the robots have feelings. 54,7% answered that robots have feelings, while the rest 45,3% had a different opinion (Teach-20). The majority of students think that robots are not smarter than humans, although 29,6% claim that they are (Teach-21). Almost half of the participants have tried to build or program a robot, being alone or as part of a group (Teach-22).

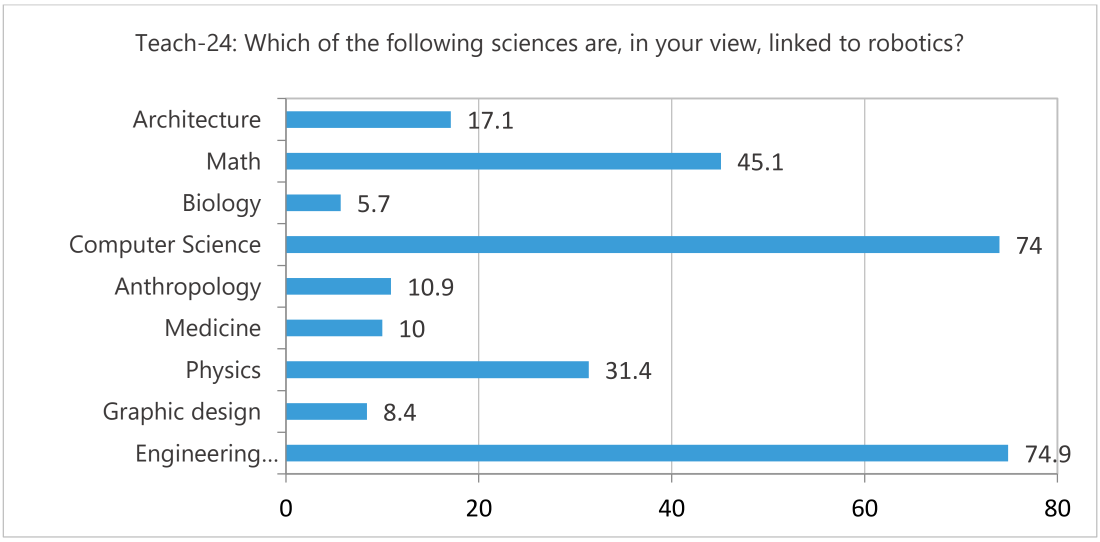


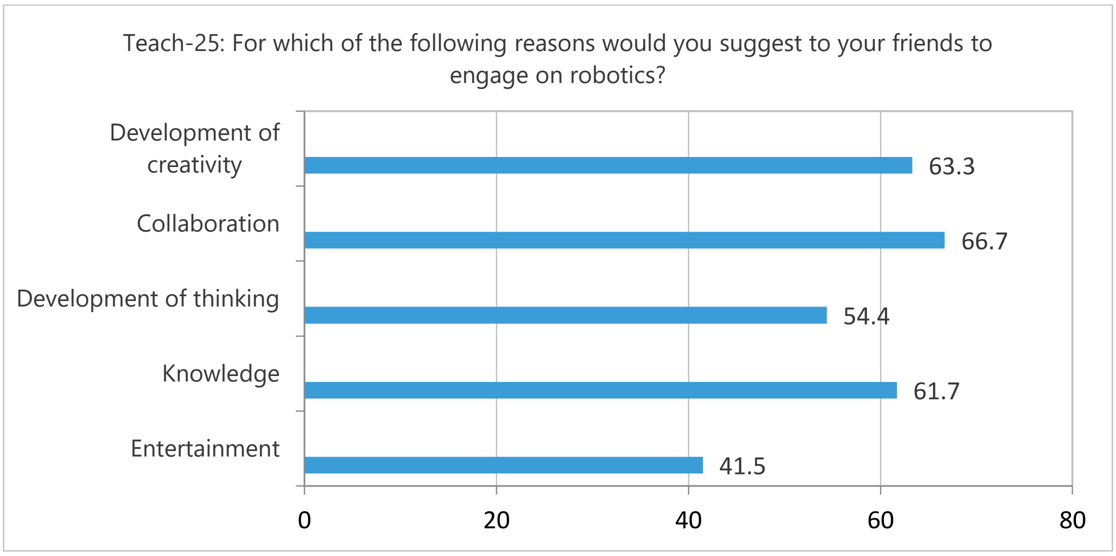




Children think of their relationship with Robotics mainly as a way to create, assemble, learn, build and partly as a way to think, imagine and play (Teach-23). Although, our participants are able to link Robotics with the obvious Sciences of Engineering (Mechanics) (74,9%) and Computer Science (74%), they fail to relate them with the other STEM topics, like Math (45,1%) and Physics (31,4%) (Teach-24).

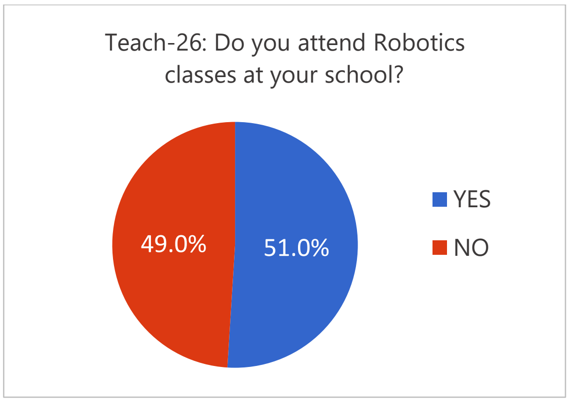


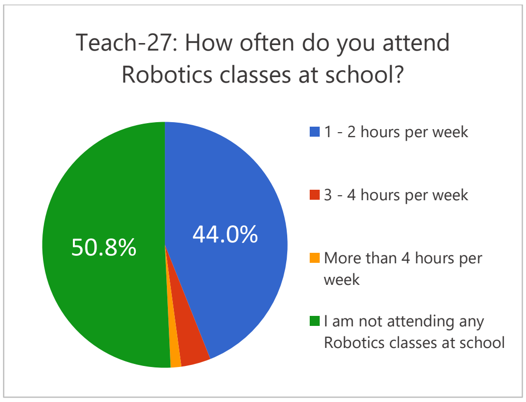



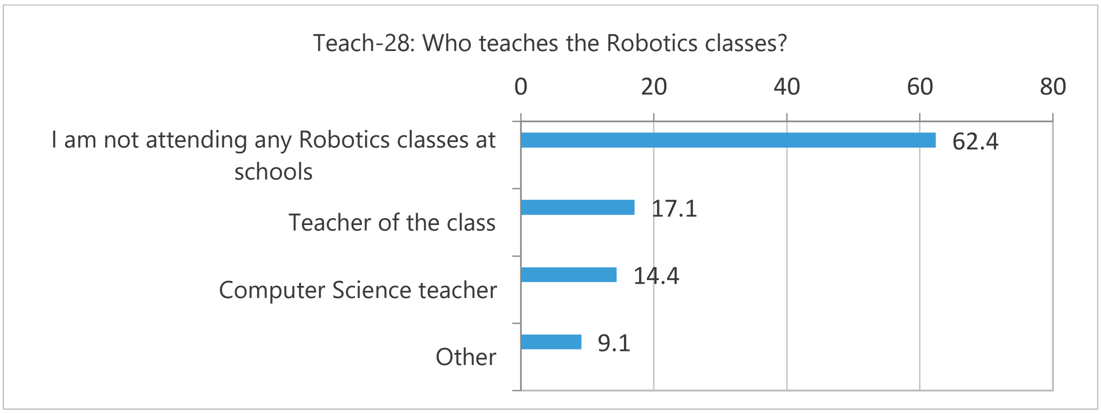

Considerable reasons for the students to suggest the engagement of their friends with Robotics is collaboration (66,7%), the development of creativity (63,3%) and gain of knowledge (61,7%) that is implied. Two secondary reasons would be the development of their thinking (54,4%) as well as the fact that it's entertaining (41,5%) (Teach-25).



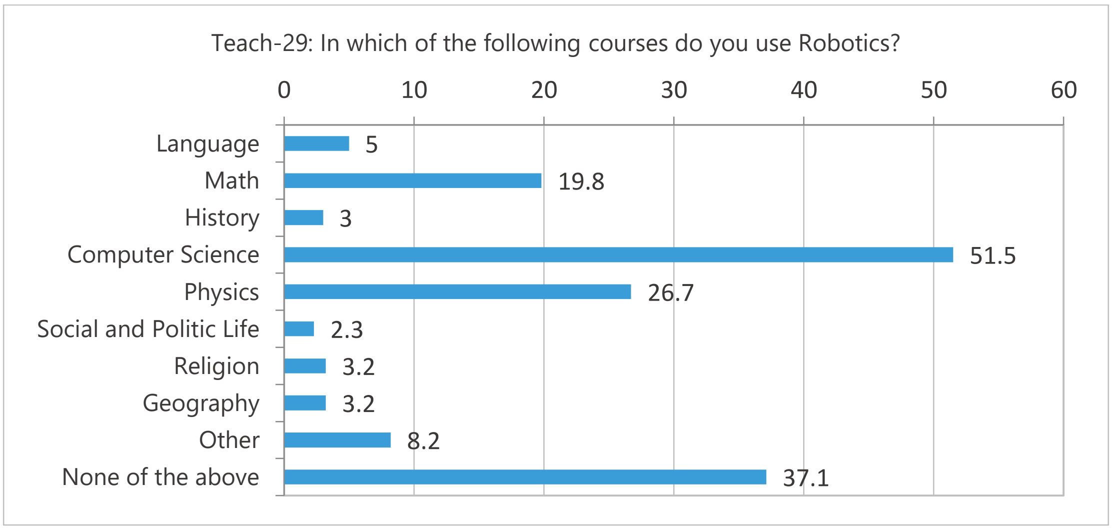

Even though teachers answered that Educational Robotics is not taught in their school, half of the students (223 out of 439) claim to attend Robotics classes for 1 or 2 hours per week that are taught by the teacher of the class (17,1%), the Computer Science teacher (14,4%) or by others (9,1%) (Teach-s 26, 27 & 28).



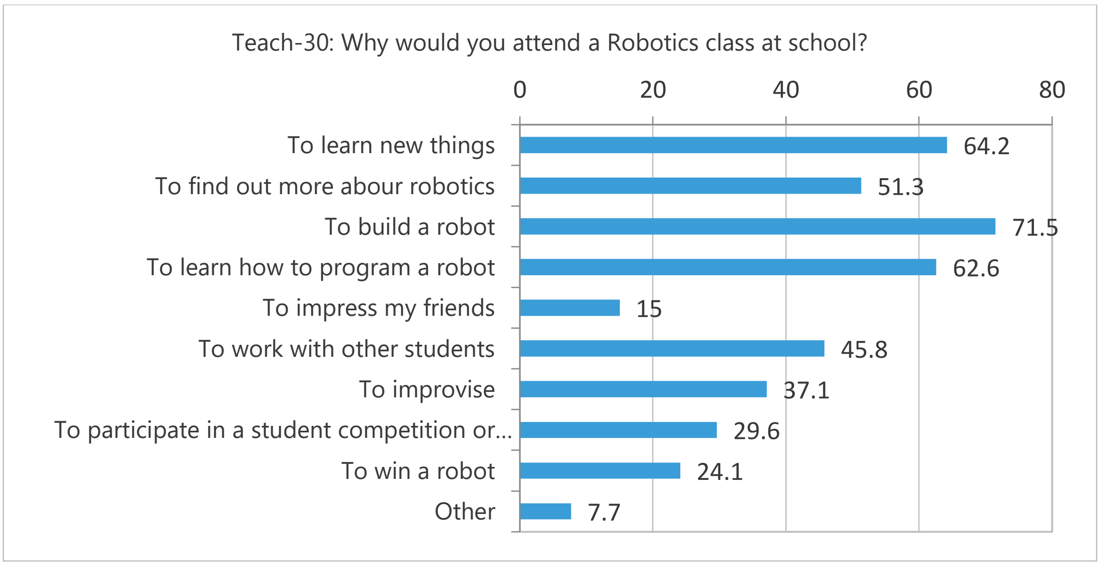




Half of the students also allege to use Robotics in the Computer Science class (51,5%) and one fourth of the children in the Physics class (26,7%) (Teach-29).




Most of the participants would like to attend a Robotics class in their school, in order to build a robot (71,5%), to learn new things (64,2%) and to learn how to program a robot (62,6%) (Teach-30).




Pupils were free to express their opinion on a hypothetical robot they would like to build and what capabilities it would have. A significant number of students proposed the construction of a robot that would be able to aid the elderly and people with special needs or diagnose and propose a treatment for diseases. A large number of the participants would want to construct a robot that would help with housework or that would transform into a means of transportation.

In conclusion, confusion about the Educational Robotics term is obvious, because even if 51% of students answered that they are not attending any Robotics classes at their school, in the question about who teaches the Robotics class, 62,4% answered that they were not attending any class of that type. Although pupils seem to be considerably interested in Educational Robotics and perceive it as a creative, exploratory way of learning that favors cooperation, they have not be given the chance to experiment in that field.

## 5. Results and Conclusion

Greece's Digital Teaching and Digital School's strategy generally, aims at integrating and incorporating Information and Communication Technologies (ICT) into the curriculum and everyday educational practice.

The aim of teaching Informatics in elementary school is the acquisition, by the students, of an initial but global and comprehensive perception of the basic computer skills, within a perspective of technological literacy and recognition of Information and Communication Technology, while developing wider critical thinking, ethics, social behavior and mood for activation and creativity, individually, in collaboration with others or as members of a team.

Digital educational content is a key priority of the Greek National Digital Educational Policy for primary and secondary education, which is reflected in the design of the national programs for the integration of ICT in school education. In-service teacher training and the development and operation of computational and networking infrastructure and services for schools, that include a national-level school network, school labs, e-classrooms and interactive teaching systems, are the other two pillars of the national policy, both strongly linked with the provision and exploitation of digital content.

It is clear that educational robotics occupies little space in the curriculum of new technologies in primary education and specifically in elementary school.

However, as it was pointed out, more and more often both Informatics teachers and teachers with special interest and knowledge, integrate in their teaching practice, educational robotics by utilizing material packages that are usually supplied by the school or offered by parents. They also take part in competitions regarding robotics.

Although there is a wide range of workshops using robots with and without curricula, there is a need to define criteria to identify best practices in curricula and the need for a process that guides teachers or workshop organizers in the creation of new activities that are pedagogically informed. There are many different successful robot competitions in Greece, but these mostly address young people already interested in STEM and use the concept of competition for motivation, there is a need to have more different learning contexts like robot art exhibitions or conferences to address more young learners. There is a need for researchers to describe educational robotics activities analytically to become more explicit and elaborate about pedagogical design and have activities that can be shared and compared. The many existing educational resources regarding robotics are based on the technology they use. There is a need for a user- and activity-centered repository. This can only be achieved by a better understanding of the stakeholders engaged in educational robotics.

# References


[1] Alimisis, D. (2013). Educational robotics: Open questions and new challenges. Themes in Science and Technology Education, 6 (1), 63-71.

[2] Alimisis, D., Moro, M., & Menegatti, E. (Eds.). (2017). Educational robotics in the makers Era. Part of the advances in intelligent systems and computing book series (Vol. 560). New York: Springer.

[3] Alkaabi, S. A. R., Alkaabi, W., Academy, A. F., & Vyver, G. (2017). Researching Student Motivation, 10(3), 193–202.

[4] Benitti, F. B. V. (2012). Exploring the educational potential of robotics in schools: a systematic review. Computers & Education, 58(3), 978-988.

[5] Bers, M. U., Flannery, L. P., Kazakoff, E. R, & Sullivan, A. (2014). Computational thinking and tinkering: Exploration of an early childhood robotics curriculum. Computers & Education, 72, 145-157.

[6] Chin, K.-Y., Hong, Z.-W., & Chen, Y.-L. (2014). Impact of Using an Educational Robot- Based Learning System on Students Motivation in Elementary Education. IEEE Transactions on Learning Technologies, 7(4), 333–345.

[7] Commission/EACEA/Eurydice, E. (2015). The Teaching Profession in Europe: Practices. Luxembourg: Publications Office of the European.

[8] Εφημερίδα Κυβερνήσεως: Αρ. Φύλλου 1376, τ. Β' 18-10-2001, άρθρο 6

[9] Eguchi, A. (2010). What is Educational Robotics? Theories behind it and practical implementation. In D. Gibson & B. Dodge (Eds.), Proceedings of SITE 2010--Society for Information Technology & Teacher Education International Conference (pp. 4006-4014). San Diego, CA, USA: Association for the Advancement of Computing in Education (AACE).

[10] Eguchi, A. (2016). RoboCupJunior for promoting STEM education, 21st century skills, and technological advancement through robotics competition. Robotics and Autonomous Sys-tems, Volume 75, Issue null, Pages 692-699.

[11] Eguchi, A. (2014). Robotics as a Learning Tool for Educational Transformation. In Proceedings of 4th International Workshop Teaching Robotics, Teaching with Robotics & 5th International Conference Robotics in Education, Padova (Italy), July 18, pp. 27-34.

[12] Instructional Materials of Introductory Training Program for ICT's Educational Use (B1 Level), Cluster B1.4: Primary Education, November 2017

[13] Johnson, J. (2003). Children, robotics, and education. Artificial Life and Robotics, 7, 16–21.

[14] Kim, C., Kim, D., Yuan, J., Hill, R. B., Doshi, P., & Thai, C. N. (2015). Robotics to promote elementary education pre-service teachers' STEM engagement, learning, and teaching. Computers & Education, 91, 14-31.

[15] Lammer L., Lepuschitz W., Kynigos C., Giuliano A., Girvan C. (2017). ER4STEM Educational Robotics for Science, Technology, Engineering and Mathematics. In: Merdan M., Lepuschitz W., Koppensteiner G., Balogh R. (eds) Robotics in Education. Advances in Intelligent Systems and Computing, vol 457. Springer, Cham.

[16] Papert, S. (1980). MINDSTORMS: Children, Computers, and Powerful Ideas. New York: Basic Books, Inc.

[17] Megalou, E. & Kaklamanis C. (2014). Photodentro Lor, The Greek National Learning Object Repository. In proceedings of INTED2014: 8th International Technology, Education and Development Conference, Valencia (Spain), 10th, 11th and 12th of March, 2014

[18] Ministry of Education and Research-Pedagogical Institute (2016). "Teaching instructions and curriculum of Primary School 2016-17 for the didactic learning object Information and Communication Technologies.

[19] Piaget, J. (1974). To understand is to invent, New York: Basic Books.

[20] Slangen, L., van Keulen, H., & Gravemeijer, K. (2011). Preparing Teachers to Teach Robotics in Primary Schools. In M. J. de Vries, H. van Keulen, S. Peters, & J. Walma van der Molen (Eds.), Professional

development for primary teachers in science and technology. The Dutch VTB-Pro project in an international perspective. (Vol. 9, pp. 181-198). Rotterdam: Sense Publishers.
[21] Sullivan, F. R., & Heffernan, J. (2016). Robotic construction kits as computational manipulatives for learning in the STEM disciplines. Journal of Research on Technology in Education, 48(2), 105-128.

## Web Resources

[1] http://dschool.edu.gr/

[2] http://www.ekt.gr/el/news/10482

[3] http://photodentro.edu.gr/aggregator/

[4] http://www.terecop.eu/index1.htm

[5] http://er4stem.acin.tuwien.ac.at/index.html

[6] https://robotics.uom.gr/en/

[7] https://eduact.org/en/home/

[8] https://www.robotixlab.com/

[9] https://wrohellas.gr/world-robot-olympiad-2018/#

[10] http://icsdweb.aegean.gr/project/aegeanrobotics/web/index.php

[11] http://robotex.gr/en/

## Annex A – Online Questionnaires

**Teachers Questionnaire:**

https://forms.gle/XbugiKDJyB9fLMz17

**Students Questionnaire:**

https://forms.gle/JPfLmteSb1rc3ouUA

# Annex B – Screenshots of Results

**Teachers**


Questions Responses 160

Section 1 of 5

Ερωτηματολόγιο Εκπαιδευτικής Ρομποτικής για Εκπαιδευτικούς ΠΕ70

Η παρούσα έρευνα πραγματοποιείται στα πλαίσια του Erasmus+ έργου "Promoting Coding and STEM Skills through Robotics: Supporting Primary Schools to develop inclusive Digital Strategies for all (CODESKILLS4ROBOTICS)". Το έργο χρηματοδοτείται από την Ευρωπαϊκή Ένωση και έχει διάρκεια 28 μήνες (Σεπτέμβριος 2018 - Δεκέμβριος 2020). Στο έργο συμμετέχουν έξι εταίροι από την Ελλάδα, το Βέλγιο, την Κύπρο και τη Σουηδία.

Σκοπός του έργου είναι η σχεδίαση και η υλοποίηση ενός καινοτόμου προγράμματος εκπαίδευσης για μαθητές και δασκάλους της πρωτοβάθμιας εκπαίδευσης, με στόχο την εισαγωγή της εκπαιδευτικής ρομποτικής και των απαραίτητων εννοιών προγραμματισμού στα σχολεία. Τα αποτελέσματα του παραπάνω έργου αναμένεται να ενισχύσουν την ικανότητα των μαθητών στην ανάπτυξη αναλυτικής και αλγοριθμικής σκέψης για την επίλυση προβλημάτων καλλιεργώντας παράλληλα δεξιότητες όπως η εφευρετικότητα και η συνεργασία.

Το παρόν ερωτηματολόγιο στοχεύει στην διερεύνηση της υπάρχουσας κατάστασης στα σχολεία όσον αφορά στις υποδομές, στις γνώσεις των εκπαιδευτικών, στην κουλτούρα, κλπ. σε σχέση με την εκπαιδευτική ρομποτική και την αξιοποίηση της για εκπαιδευτικούς σκοπούς.

Το ερωτηματολόγιο απευθύνεται αποκλειστικά σε εν ενεργεία εκπαιδευτικούς πρωτοβάθμιας εκπαίδευσης.

Η συμβολή σας στην συμπλήρωση του ερωτηματολογίου είναι πολύ σημαντική για την επιτυχή και αποτελεσματική υλοποίηση του παραπάνω έργου με τα μέγιστα δυνατά οφέλη για τους μαθητές και τους δασκάλους της πρωτοβάθμιας εκπαίδευσης.

Image title

CODESKILLS
4ROBOTICS

CODESKILLS
4ROBOTICS

**Students**

Questions Responses 440

Section 1 of 4

## Ερωτηματολόγιο Εκπαιδευτικής Ρομποτικής για μαθητές

Η παρούσα έρευνα πραγματοποιείται στα πλαίσια του Erasmus+ έργου Promoting Coding and STEM Skills through Robotics: Supporting Primary Schools to develop inclusive Digital Strategies for all (CODESKILLS4ROBOTICS). Το έργο χρηματοδοτείται από την Ευρωπαϊκή Ενωση και έχει διάρκεια 28 μήνες (Σεπτέμβριος 2018 - Δεκέμβριος 2020). Στο έργο συμμετέχουν έξι εταίροι από την Ελλάδα, το Βέλγιο, την Κύπρο και τη Σουηδία.

Σκοπός του έργου είναι η σχεδίαση και η υλοποίηση ενός καινοτόμου προγράμματος εκπαίδευσης για μαθητές και δασκάλους της πρωτοβάθμιας εκπαίδευσης, με στόχο την εισαγωγή της εκπαιδευτικής ρομποτικής και των απαραίτητων εννοιών προγραμματισμού στα σχολεία. Τα αποτελέσματα του παραπάνω έργου αναμένεται να ενισχύσουν την ικανότητα των μαθητών στην ανάπτυξη αναλυτικής και αλγοριθμικής σκέψης για την επίλυση προβλημάτων καλλιεργώντας παράλληλα δεξιότητες όπως η εφευρετικότητα και η συνεργασία.

Το παρόν ερωτηματολόγιο στοχεύει στην διερεύνηση των στάσεων και των αντιλήψεων των μαθητών σχετικά με την εκπαιδευτική ρομποτική στο σχολείο.

Το ερωτηματολόγιο απευθύνεται αποκλειστικά σε μαθητές πρωτοβάθμιας εκπαίδευσης ηλικίας 9 με 12 ετών. Προτείνουμε για την αποτελεσματικότερη συμπλήρωση του ερωτηματολογίου να είναι παρών ο γονέας ή ο εκπαιδευτικός.

Η συμβολή σας στην συμπλήρωση του ερωτηματολογίου είναι πολύ σημαντική για την επιτυχή και αποτελεσματική υλοποίηση του έργου με σκοπό τα μέγιστα δυνατά οφέλη για τους μαθητές και τους δασκάλους της πρωτοβάθμιας εκπαίδευσης.

Image title

CODESKILLS
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