

**Deliverable 1.1 - Database of European, national, and local initiative
and associated networking tools**

D11 - Intellectual Output #1 - Part #1

AN EDUCATIVE PLATFORM BASED ON MAKECODE, CIRCUITPYTHON & SCRATCH FOR CREATIVITY AND PARTICIPATORY SCIENCES USING IOT BOARDS





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Let's STEAM

An educative platform based on MakeCode, CircuitPython & Scratch for creativity and participatory sciences using IoT boards

D1.1 – Database of European, national, and local initiative and associated networking tools

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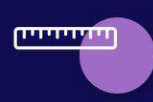
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Output 1: Pedagogical scenarios	This deliverable is linked to the task TO1.1 which aims at understanding the contextual work performed until now that can ease the implementation of LET'S STEAM and participate to the understanding of the targets' needs. This work will be based on several subtasks including identifying the existing initiatives within a very detailed database which is the first version here. This database will be updated all over the project duration.

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Let’s STEAM aims at developing a training of teachers’ programme dedicated to computational thinking and creativity skills using IoT board and digital tools at larger scale. The project runs from September 2019 to August 2022. It involves 8 partners and is coordinated by Aix-Marseille Université.

More information on the project can be found on the project website: www.lets-steam.eu

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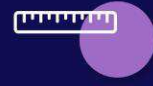
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1. INTRODUCTION

The Let's STEAM project aims to support the development of a Training of Teachers (ToT) programme targeting the development of computational thinking and creativity skills associated with concrete and practical competences in using IoT boards and related programming open source solutions (namely MakeCode, CircuitPython, Scratch) towards better integration of these technologies in the classroom. More specifically, Let's STEAM aims to be positioned in the framework of an inquiry-based approach, showing to the teachers the potential of programming in an interdisciplinary approach, more than for a pure technical vision.

However, the partners of the Let's STEAM project are aware that they are evolving in a context where more and more initiatives aimed at developing programming skills and practices, from a practical framework. This background of several projects targeting the increase of coding competencies for students and teachers is highly interesting for the implementation of the Let's STEAM curriculum. Indeed, they are already providing a set of educational materials, that, even if they cannot be integrated as such in the ToT programme of the project because of their different positioning, can inspire, methodologically guide and give examples of pedagogies that are successful towards teachers.

Hence, networking and clustering with these initiatives during the project is crucial for:

- **Developing a complementary approach to empower EU funded projects in sharing and enriching contents.**
- **Enhancing the programming practices by creating synergies at EU scale between the different initiatives.**

This first part of Output 1 summarises the identification of complementary initiatives that can inspire the implementation of Let's STEAM. This database will keep being fed during the entire duration of the project. Clustering, networking and specific communication activities will be undertaken through the work performed in the selection of these relevant projects and initiatives towards a better visibility at local, national and EU scale of linked initiatives and a global awareness raising on the importance of programming in the current STEAM curricula. In practice, this work will lead to:

- The **identification of national and European projects**, funded under various programs and initiatives, or other kind of initiatives working on the project's themes and creating a network ensuring cooperation, in order to share problems and visions,
- Organisation of **joint-discussions and dissemination** of results among a larger audience,
- Invitation to **joint-events, consortium meetings, multiplier events**,
- **Brainstorming on the potential of coding practices** in STEAM education empowerment and potential towards the development of new initiatives.



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2. METHODOLOGY

The identification of the linked initiatives is performed on a constant basis during the whole project lifetime with the objective of creating new collaborations with relevant projects. The methodology is based on the identification of several categories of interesting undergoing activities outside the consortium i.e.:

1. Erasmus + projects with similar scope
2. Horizon 2020 framework programme
3. Competitions at local, national or EU scale
4. Initiatives handled by schools
5. Facilitator networks, policymakers and EU initiatives
6. Supporting organisations

Each category has been assessed regarding the potential added value for synergies and brainstorming purpose. The following main aims have been defined per typology of projects:

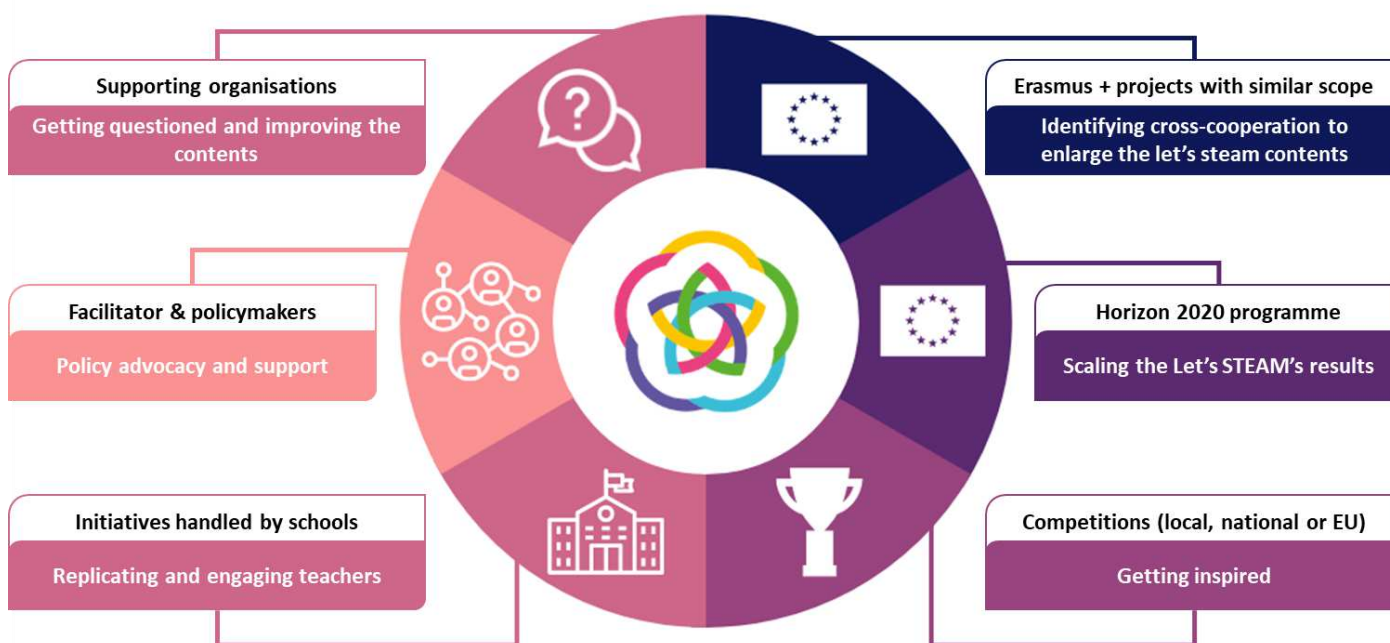


Figure 1 - Projects typologies

The selected projects are registered in the Let's STEAM private working space in a database updated and delivered publicly every six months. Each initiative is linked to a project partner responsible depending on the consortium network, country of origin and skills to perform the communication and clustering activities described all along this document. From the assessment of this database, the partners have highlighted the three parts developed hereunder:

1. Strategy and recommendations from the assessment of the initiatives
2. Action plan for synergies and clustering activities





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3. STRATEGY AND RECOMMENDATIONS FROM THE ASSESSMENT OF THE INITIATIVES

This section aims at identifying the linked initiative map linked to the objectives of the Let's STEAM project. This overview is continuously updated and expanded depending on the network growth and communication activities. The network has been divided regarding the type of initiatives and the outcomes to be reached based on potential synergies and integration of the results.

3.1 INITIATIVES' ANALYSIS

At the stage of Output 1, this list provides a good overview of how the subject targeted by Let's STEAM has been tackled in the past and by the current under-going projects. This analysis aims at structuring the specifications of Let's STEAM by analysing best practices, success and achievements of similar scope projects but also highlighted the potential gaps that Let's STEAM wants to tackle to provide an integrated and complementary vision of computer programming practices at school and beyond.

Hence, these initiatives have been selected among diverse programmes, each of them providing different inputs to Let's STEAM from **short term impacts** (such as supporting the specifications' development) and **longer term added value** for replicating (identifying partners in diverse European countries not representing in the Let's STEAM consortium), transferring (from needs' analysis of diverse targets, outside the teachers' community), scaling and sustaining the results (through larger initiatives and ambitious programmes).

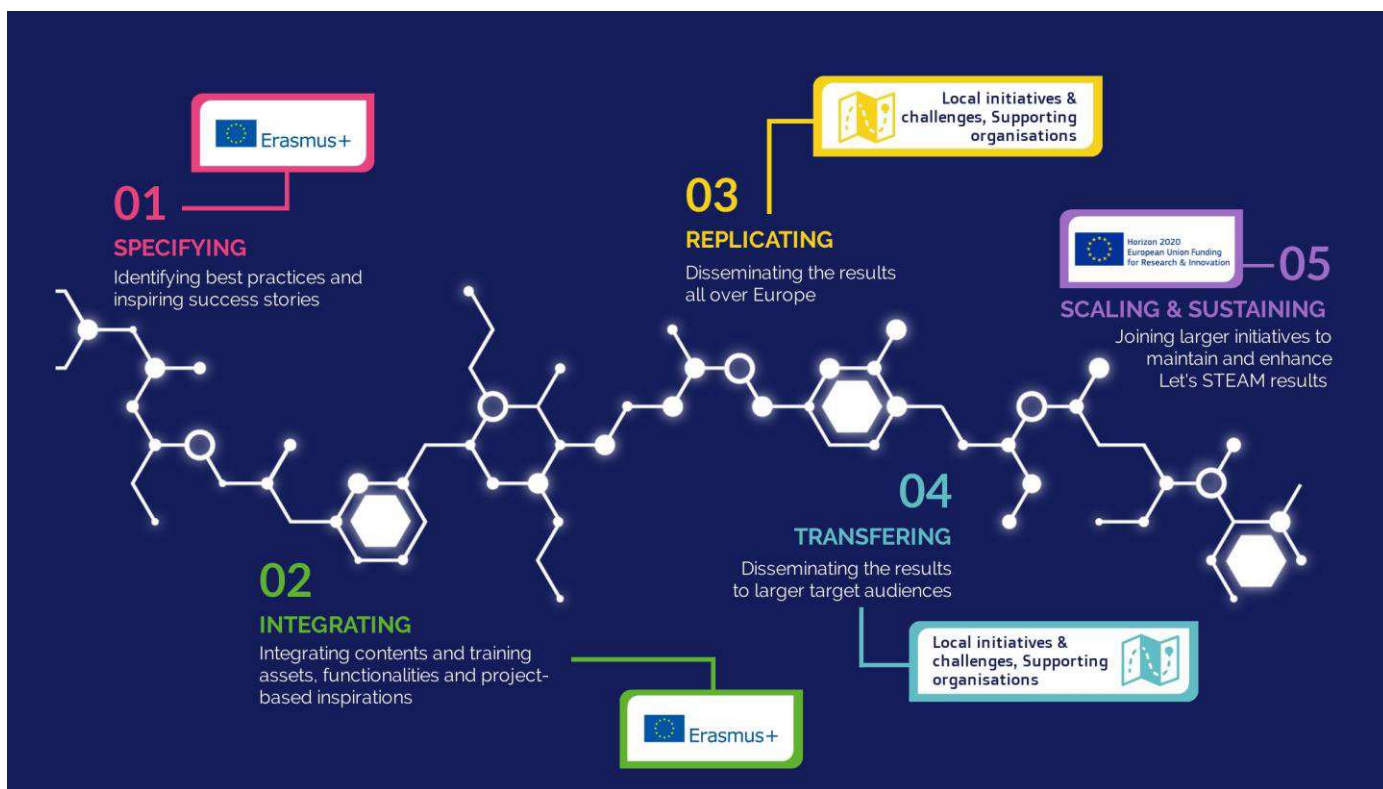


Figure 2 - Overview of the short to long term synergy process under Let's STEAM

All of these projects can be classified around 5 cross-objectives:

1. Active & Problem-based learning approach through technology, robotics and IoT (Internet of Things)
2. Training of teachers & trainers and good practices in teaching ICT (Information and Communications Technology)
3. Basics of coding and integration of programming in national curricula
4. 21st century skills
5. Inclusiveness & Gender equality





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Based on this classification, the Let's STEAM project can be shaped around learning and pedagogical scenarios on the intersection between these 5 objectives through the following commitments:

1. **Let's STEAM pillar #1: Provide an inquiry-based approach** structured around enriching practices and projects to enhance the motivation of teachers of using specifically IoT boards in educational background, however with the objectives of developing programming and ICT spirit as a whole.
2. **Let's STEAM pillar #2: Develop a full training of teachers' programme** structured around the teachers' needs (O1 – Part 2), active pedagogical approaches, inquiry-based methods (D1.3) and divided in modules from theory (ICT-based learning, Computational Thinking & Creativity).
3. **Let's STEAM pillar #3: Provide practical skills to teachers** and, through a cascade effects, **to students** on how to use programming open source software and IoT boards, from **basics** (how to launch the software and use the simple functionalities) to the development of a teacher-contributor position (how to create new functionalities).
4. **Let's STEAM pillar #4:** Develop the knowledge of the teachers on how programming can bring **creativity, based on a computational thinking vision of coding** (developed through pillar #1 and pillar #2, operationalise through pillar #3).
5. **Let's STEAM pillar #5: Assess the project results under an evaluation scheme integrating gender equity, inclusiveness and well-being** of the teachers and students as core added value of the project as a result of the achievement of the 4 pillars presented above.

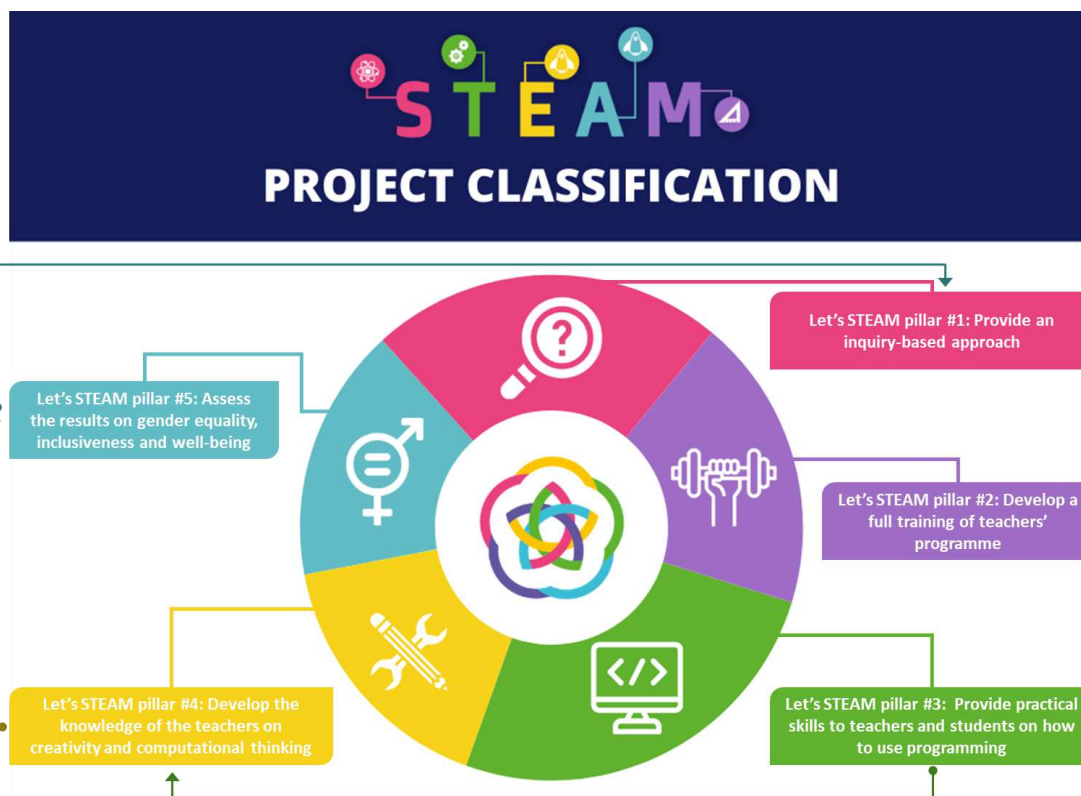


Figure 3 - Pillars of Let's STEAM against the assessment of the linked initiatives' context and objectives



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3.2 ERASMUS + PROJECTS WITH SIMILAR SCOPE – IDENTIFYING CROSS-COOPERATION TO ENLARGE THE LET’S STEAM CONTENTS

Reviewing the database of the Erasmus + Strategic Partnerships results, several projects have been identified as highly relevant within the context of Let’s STEAM. These projects have similar level of ambition, being funded under the same call, and can provide either additional resources, or can be implemented in diverse geographical areas. A pre-assessment of the database has highlighted the projects presented hereunder, providing good insights of each of the categories identified above. In addition, the partners have studied their vision of the context and potential issues nowadays linked to coding and programming practices. These analyses have led to additional information on the assessment of the current needs of the teachers and the students that enable to enlarge and expand the Let’s STEAM understanding of the framework in which the project is evolving, comparing with projects under the same scope in terms of targets/budget/ambition. In addition, several projects under mobility and schools’ exchanges have been selected providing accurate channels to disseminate the project results towards teachers interested by the topic. From this analysis, 25 projects have been studied from now, presented in the full version of the D1.1 available on the Let’s STEAM website and Erasmus + result platform. From these projects, topics of interest have been analysed resulting in a majority of the projects working on the basics of programming:

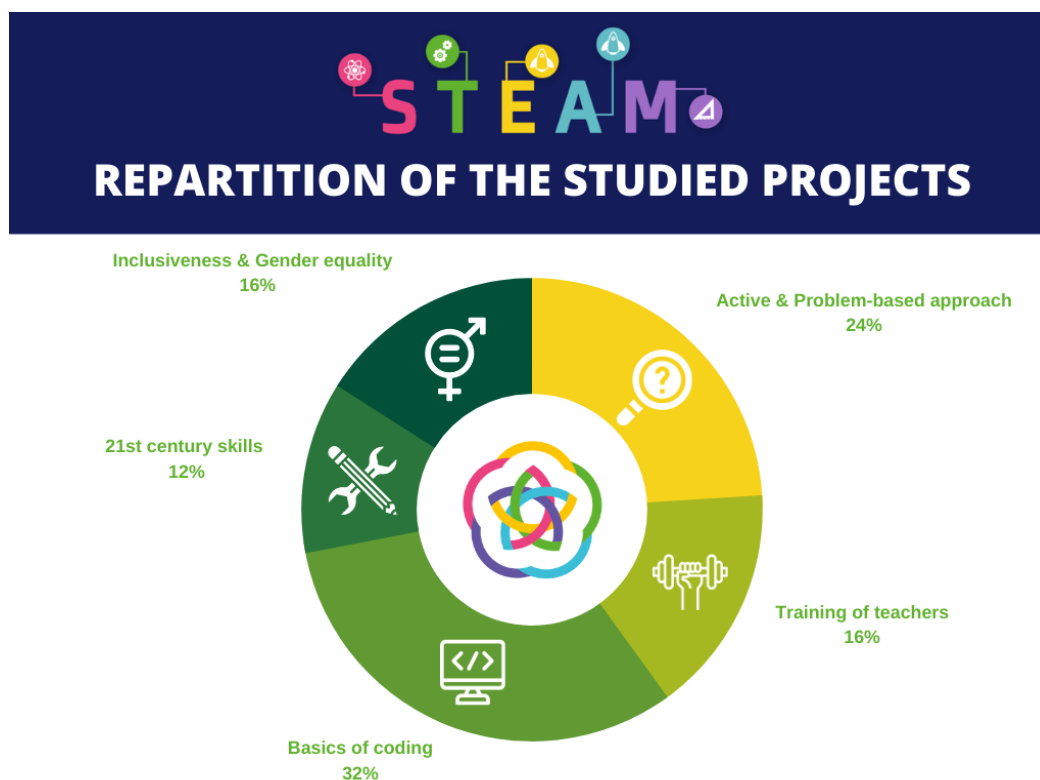


Figure 4 - Repartition of the studied projects per pre-defined typologies on Erasmus + similar scope projects

- a. Interdisciplinary and Collaborative themAtic leaRning of technOlogy and Science – Active & Problem-based learning approach through technology, robotics and IoT: ICAROS stands for Interdisciplinary and Collaborative themAtic leaRning of technOlogy and Science. It is a year-long educational project implemented annually since 2016 as a dedicated extra-curriculum student-club of Ellinogermaniki Agogi’s High School. ICAROS project is aiming at enhancing educational practices that will lead to better motivated students with improved study-goal achievements. The assumption is that this can be done through thematic learning with an entrepreneurial learning approach, and student-led knowledge development through experimentation and real-world problem solving. ICAROS student-club and its activities are focusing on the design, development, testing and operation of x-quadrotor drones equipped with cameras and sensors. The project thus makes use of modern technology that captures the imagination of students, as well as innovative methods spanning over several disciplines, to





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demonstrate the real-world applicability of Science, Technology, Engineering and Mathematics (STEM) and other related subjects. The project also aims to inspire students to develop an entrepreneurial approach to science, research and technology and to encourage independent knowledge development, DIY (Do-It-Yourself) and making.



Figure 5 - Students of ICAROS club working on the assembly of drone frames, integration of electronics, testing of components and other tasks to build a complete operational quadrotor drone

- b. Using retro gaming consoles to revive hands on play and promote STEM – Active & Problem-based learning approach through technology, robotic and IoT: RETROSTEM is an Erasmus+ project (2018-1-UK01-KA201-048152) run by a consortium of partners from education, academia and industry. RETROSTEM's approach is to promote the acquisition of skills of teachers and students in the digital era by developing innovative learning practices supported by a Raspberry Pi based console and DIY electronics kits. This aims to support teachers in delivering subjects extending their present knowledge and enhance their understanding on how to effectively engage students to the learning process of programming concepts and STEM subjects through hands-on play in a retro design game console and electronic kits. The project designed a hands-on console and developed a comprehensive of step-by-step instructions, examples of educational activities and training modules for teachers and students of primary and secondary education based on Scratch and Python programming languages and on Minecraft environment. These are implemented and piloted at small scale before they are refined and released as final intellectual outputs of the project. They are also translated and are available in four different languages, namely in English, Greek, Polish and Romanian. In the framework of LET'S STEAM, the RETROSTEM's educational guides and content can be utilized in different countries at schools of primary, secondary and vocational education.



In the framework of LET'S STEAM, STM32 board with its sensors and functionalities can be incorporated in both projects educational activities along with the coding guides and tutorials to be developed, hence providing additional contents and practices to the implementation of challenge-based initiatives. In counterpart, the assumptions and results of those projects, on motivation axis and experimentation-driven approach, can bring strong added-value in understanding how to present the interest of the teachers in getting trained on programming issues. Eventually, the projects developed through ICAROS and RETROSTEM are inspiring initiatives to present concrete outcomes to the teachers in Let's STEAM while recruiting them for the training programme.

- c. Code, Content Creation and Culture for Digital Education – Training of teachers & trainers and good practices in teaching ICT: The 4CDE project aims at producing open educational resources (OERs) to be used for professional purposes in the area of ICT learning, with adults and students. These OERs are structured in 44 lessons in the field of programming, narratives methodologies (storytelling), rich media production (photography, video and sound), and digital. The lessons, representing a 120 hrs course, can be accessed by two different paths: a non-formal course (designed for adult education), structured in 4 themes (audiovisual, storytelling, creative code, digital art), or a formal course (designed for formal students) structured in 3 levels (referring to





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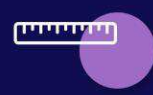
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a Borges' story) on one single multilingual platform. A Skills Reference Guide accompany the lessons and the platform includes all educational resources, pedagogical information, and assessment processes.

If not directly training teachers and educators, the 4CDE projects is highly relevant to Let's STEAM as the contents and practices created are strongly inspiring for the teachers to be trained on our project. In addition, impact assessments have been performed providing interesting insights for Let's STEAM, based on surveys and questionnaires, and supported by examples of best practices.

d. KidsCodr - We teach kids programming – Basics of coding and integration of programming in national curricula:

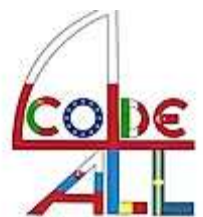
KidsCodr project created a complete training curriculum to teach digital skills for children in age 6-14 years. The curriculum is divided into two parts. The software part where learning takes place in various programs, applications or directly in the programming language. This part is composed of the training modules like Scratch Junior, Scratch, Kodulab, MIT App Inventor, Javascript Games and Minecraft. The hardware part is focused on programming robots and hardware, and this allows students to receive immediate feedback on their work in a real environment (move of the robot, activate functions, etc.). A web application kidscodr.eu, will unite at a glance all the educational materials and creates a system for communication and development of further KidsCodr activities.



The KidsCodr project, such as other projects aims at developing programming training programmes, are highly interesting for Let's STEAM as they provide operational contents and examples to feed the part of the training programme that will aim at providing practical skills to the teachers. If not the full objective of Let's STEAM, still all projects already working with CircuitPython, Scratch and MakeCode are considered as sources of functionalities and examples supporting the inquiry-based methodology of the project.

e. Computational thinking and Digital skills in European education for all – 21st century skills:

The project "CO.D.E4all" wants to create a network of school across Europe to develop the "21st Century Skills"; such as creativity and innovation, critical thinking and problem solving, digital competence, teamwork and collaboration in virtual teams, multiple languages and cultural awareness. Our aim is to develop and share good practices and innovative educational ways to use coding and new technologies at school, for students from 3 to 13 years old , in order to create a computational thinking vertical curriculum . Our aim is also to build a Teachers' "Code European community", where we can share good coding and computer science practices that we are using in our classroom now, inform other teachers, public, families about our project, collaborate with different nations researchers, technology developers, state, and local leaders to disseminate the idea that technology is advanced in ways that promote young children's healthy development and learning.



Projects in the category of the 21st century skills' target are highly interesting for Let's STEAM as a general framework for the whole project activities' implementation. Indeed, computational thinking can be a difficult concept to acquire for all, and hence, all the activities pre-developed in other projects, enabling to disseminate the logic and objective of such concept is highly important to help in the teachers' interest and acceptance of our courses.

f. DIVERSELY CODING: coding for improving the social inclusion – Inclusiveness & Gender equality:

The project aims to develop a training course on "Diverse coding", enabling people with specific disabilities: Adults (Age 18-60 years) with hearing disorders to increase their digital skills and programming, with a methodology that applies European recommendations to validate non-formal and informal learning to facilitate recognition and transfer of results. Furthermore, implementing a specific design of the training path and the development of contents. The project is aimed at people who work or who are unemployed with hearing disorders to improve their social integration and improve the informal educational path in such an innovative and formative context.





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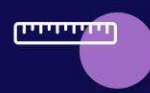
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g. Ladies Code Their Future – Inclusiveness & Gender equality: The direct target group of the LIFT project were “disadvantaged women”, defined, for the purpose of this project, as women who face isolation and hardship as a result of them having a low-level of education, being unemployed or living in a rural location where their basic needs for services, employment and education are currently not being met. The project consortium developed the products addressed to the direct target group in various languages (Dutch, English, Hungarian, Spanish, Portuguese, Romanian) for better accessibility: we are aware that English is a “must” for programming, but low level of English language competence should not be an obstacle in making a decision to start learning IT. Their intention of building a career in ICT motivated women taking part in our pilot activities to start developing their language skills too, concomitantly with starting a course in ICT. All basic IT training/coding programmes emphasise that anyone can learn how to program as long as they are willing to put in the time and effort. The LIFT project team built its curriculum, learning platform and “virtual tour” of women role-models in the ICT sector upon this positive, optimistic presumption, encouraging women to dare to think about entering the ICT job market, offering them basic introduction to the world of ICT and coding: our platform being available not only in English but also in Dutch, in Hungarian, Italian, in Portuguese and in Spanish.



<Ladies> <Code> <Their> <Future>

Even if not the primary goal of the project, the partners are attached to finding pedagogies that can rely on motivation more than technicity to enable catching young girls for instance in the programming process.

The contents developed for instance by the LIFT project, even if not directly in the target audience of Let’s STEAM can be useful for dissemination activities towards young girls thanks to the work done on representativity, showing success stories to the students of women careers in ICT.

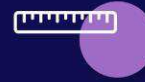
The work performed on the axis of motivation is in addition very relevant, and the results will be integrated as guiding principles of Let’s STEAM inspiring activities especially on the stereotypes issues where LIFT report on “Barriers for Women to Participate in ICT Training and Employment” concludes in “Gender stereotypes (women should work “with kids or people”; women prefer “face-to-face” communication to tech-based communication; boys learn technological subjects more easily; women “can’t make synthesis”, they are “more concerned with details”; etc. – mentioned over 10 times;

3.3 HORIZON 2020 FRAMEWORK PROGRAMME – FINDING REPLICATION AND SCALABILITY FOR THE LET’S STEAM RESULTS

Horizon 2020 framework programme has been reviewed through the scope of Let’s STEAM, with the objectives of highlighting larger initiatives that can help identifying during the last year of the project, patterns and strategies for scaling, replicating and enlarging the project results. For instance, the following project is highly relevant with Let’s STEAM scope as example of large initiative capitalising on results such as the ones developed through our project:

Go-Lab Initiative: The Go-Lab Initiative arose from the successful Go-Lab project (2012-2016) and gave the initiative its name. The aim of the Go-Lab Initiative is to facilitate the use of innovative learning technologies in STEM education, with a focus on online laboratories (Labs) and inquiry learning applications (Apps). Using the Go-Lab ecosystem, teachers can find various Labs and Apps, and create customized Inquiry Learning Spaces (ILSs). Furthermore, the Go-Lab Initiative conducts training for teachers on the topics of Inquiry-Based Science Education (IBSE), development of 21st-century skills, and the use of ICT and the Go-Lab ecosystem in the classroom. Over the years, several projects contributed to the development of the Go-Lab ecosystem, which consists of the Go-Lab Sharing and Support platform (Golabz) and the Authoring and Learning platform (Graasp). In cooperation with multiple partners, experts, and external online lab providers, the Go-Lab ecosystem has the biggest collection of Labs (virtual labs, remote labs and data sets), a set of pedagogically designed Apps and more than a thousand ILSs created by teachers and experts. The Go-Lab Initiative team has conducted hundreds of training events



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across Europe and in Africa, reaching out thousands of teachers, educators, and educational institute leaders. The Go-Lab ecosystem is a free platform that can be used by any teacher from any country.

In the framework of Horizon 2020, the partners hence are performing a regular check on the following calls for proposals, identified as highly relevant for scaling and clustering with the Let's STEAM concept:

Table 1 - List of calls for proposal analysed within H2020

Call for proposal	Topic covered
SwafS-01-2018-2019-2020: Open schooling and collaboration on science education	Creation of new partnerships in local communities to foster improved science education for all citizens
SwafS-23-2020: Grounding RRI in society with a focus on citizen science	Promotion of citizens' and their associations' engagement in science, through an integrated approach covering some or all scientific disciplines
SwafS-24-2020: Science education outside the classroom	Available knowledge on science education outside the classroom and its impact on citizens, considering possible gender and geographical differences
SwafS-13-2018: Gender Equality Academy and dissemination of gender knowledge across Europe	Design training material for trainers, practitioners and researchers on a variety of issues relevant for gender equality in research and innovation (gender balance, gender dimension, gender bias, etc.)
SwafS-26-2020: Innovators of the future: bridging the gender gap	Hands on activities, seminars, mentoring sessions, gender-inclusive innovative tools, etc. Development of the support of role models (e.g. Former winners of the EU Prize for Women Innovators)
DT-TRANSFORMATIONS-07-2019: The impact of technological transformations on children and youth	Assess the online behaviour of children and young people as well as their use of digital content and devices by socio-economic, gender and age group, with attention to motivations for using ICT at home, for leisure and in schools or training institutions
DT-TRANSFORMATIONS-21-2020: Mentoring scheme for schools: mainstreaming innovation by spreading the advanced ICT-based teaching practices to a wide circle of schools	Build, coordinate and seek to expand an inclusive pan-European network of schools where schools interested in pedagogical uses of ICT can build their know-how by learning from their more advanced peers through demonstrations of best pedagogically sound practice

3.4 NATIONAL PROJECTS & INITIATIVES – GOING LOCAL AND BEING INTEGRATED IN THE CURRICULA

Several projects funded at national levels have been analysed. These projects offer opportunities for synergy exploitation with regard to the project outcomes with the support of local policymakers and strong organisations, enabling an easier implementation at local scale. Examples are provided here:

- a. **MIND THE GAP: A SNAPSHOT OF E-SKILLS GENDER DIFFERENCES IN SPAIN (MindGAP)**. The main goal of this project is to measure the digital gender gap in terms of self-perception and performance of e-skills and analyse if it predicts women STEM dropout rates in Spain. Main inputs for let's STEAM is that this project may contribute to better understand some of the inequalities underlying when promoting STEM and, in particular, computational and programming activities. **These inequalities will be more evident when designing and implementing teacher trainings. By promoting the introduction of a gender perspective, Let's STEAM will increase its inclusiveness.**
- b. **OBSERV@COMDID: AN E-OBSERVATORY FOR THE DEVELOPMENT AND THE PROFESSIONAL PRACTICE OF TEACHERS' DIGITAL COMPETENCE IN PRE-SCHOOL, PRIMARY AND SECONDARY SCHOOL EDUCATION**. This project aims to create an "Observatory" or the use of ICT in Spain in order to evaluate the Teachers' Digital Competence (TDC) and provide strategies to promote the development of Teachers' Digital Competence and their translation to the use of use of digital resources in preschool, primary and secondary school education. For Let's STEAM, the Observatory Observ@COMDID may contribute to understand the relationship between teachers' digital competence (assessed through the questionnaires of the project) and the uses of different ICT in classroom -such





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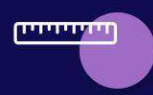
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as robotics- to identify patterns and better define teachers’ needs. Thus, from this analysis the personalization of teacher’s training according to the profiles emerging can be more accurately defined. We have been developing a collection of videos to disseminate the results which are being posted in [Twitter](#) and in the end section of the homepage. We are developing a series of videos to disseminate the project. **Some of them have little relation with Let’s STEAM, but other ones (related with gender and STEM practices) are clearly related.**

- c. **STEAMCat.** This is the project of the Ministry of Education of Catalonia which aims at promoting STEAM education in secondary teachers (mostly) by providing specific trainings and follow-up. One of their main foci of interest is the use of robotics in secondary lessons. **They explicitly support our Let’s STEAM project and, actually, they have collaborated with us in the data gathering.**
- d. **Class’Code:** This is an innovative training program which, since the start of the 2016 school year, has trained education and animation professionals to give them the means to introduce girls and boys from 8 to 14 years old to computer thinking. . It includes 5 online modules (MOOC type) coupled with meeting times between learners. Each module allows in ten hours spread over 3 to 4 weeks, to facilitate the first discovery workshops with young people: creative programming, coding of information, fun robotics and related societal issues. **The Class’Code initiative will provide inputs on training contents in addition to a good channel for recruiting teachers in France.**

3.5 COMPETITIONS AT LOCAL, NATIONAL OR EU SCALE – GETTING INSPIRED

In addition to projects, competitions at local, national and EU Scale have been studied. These events are perfect moments to disseminate the content of Let’s STEAM and provide additional assets to participants in terms of platform functionalities. Examples of competitions are identified hereunder:

Concours Robot ITER

ITER Robots Master gathered nearly 600 participants on May 24, 2018 in Manosque, France. Organized by the Agence ITER France, with the support of the Aix-Marseille-Nice academy and the engineers of ITER and CEA, ITER Robots allows middle and high school students to work in project teams. Each team presents robotics, general culture and communication tests.

Tarraconada & mSchools

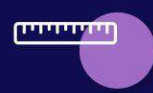
Tarraconada is an Spanish event aimed at secondary students and teachers in which students meet for one day and do ICT activities together using augmented realty. This project is supported by mSchools (educative project of GSMA). We also have contacts with them and we believe that their initiative mSchools Students Awards (in which the Ministry of Education also collaborates) is relevant for the project. These awards are given to students’ projects off app development and/or Scratch coding (depending on the age).

First Lego League of Reus

First Lego League of Reus is a robotic Spanish creation program for young people from 9 to 16 years, which is designed to motivate young people with science and technology and teach them important values and knowledge. FLL can be performed in a class but was not designed for that purpose. Teams, made up of ten kids with at least one adult coach, can also come from a pre-existing, extracurricular club or organization, or just be a group of friends who want to do something amazing. Contrary to popular belief, coaches do not need any technical experience. If aimed at the use of robots it can be a good arena to identify teachers to participate in the Let’s STEAM project.

3.6 INITIATIVES HANDLED BY SCHOOLS – REPLICATING AND ENGAGING TEACHERS

During Let’s STEAM, the partners understand engaging teachers will be a challenge. Hence, the consortium is keeping track record of several initiatives handled by schools and teachers to enable developing a compendium of activities that can be considered as inspiring to convince teachers that undertaking our curriculum will help them gaining contents, motivation and interests from the students. Several initiatives are highlighted hereunder:

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NATIONAL THEMATIC EDUCATIONAL CONTEST “BUILD YOUR OWN SEISMOGRAPH”. Since 2016, Ellinogermaniki Agogi in collaboration with the National Observatory of Athens organize a thematic educational contest which runs at national level in Greece. Eligible to participate are student teams of primary and secondary, both general and vocational, education. The main goal or challenge of each team is to build a DIY seismograph, to elaborate on the principles of operation, to document the whole procedure, and finally to make a comprehensive presentation of their study, work and construction. The evaluation criteria include:

- Overall quality and completeness of work
- Scientific correctness
- Incorporation of audiovisual material created by students
- Emphasis in inquiry-based science learning, problem solving, creativity and collaboration
- Inclusion of students of social or economic disadvantage and/or special needs
- Emphasis in promoting awareness within the school or local community of measures of civic protection and precautionary actions in case of an earthquake event

The contest is communicated officially to all schools from the Ministry of Education of Greece and it runs annually from January to April. Every year the contest attracts the interest of schools across the country, from urban and rural areas. School teams share the devices they built using **various hardware technologies such as Arduino, Raspberry Pi, Lego Mindstorm and software programming platforms in Scratch, Python, C++, etc.** Among the participants are both vocational schools and schools of students of special needs along with gymnasiums and lyceums of general education.

An evaluation committee assess all submitted entries and accompanying materials of each school team and list the final contest winners. The winner student teams, and their teachers/supervisors are then invited to receive a commemorative symbolic certificate and more importantly to present their work and demonstrate their seismograph in a ceremony is e.g. in Athens Science Festival or other similar event. The ceremony resembles the function of a real scientific conference where different groups of researchers, scientists or engineers present their work and discuss their findings, exchange ideas and experiences towards acquiring and advancing knowledge or providing solutions to problems and challenges. In this way, and throughout their preparation and work in the framework of the contest, students experience a comprehensive practical understanding of how science and technology advance, increase their interest in related subjects and are motivated to consider them as potential career paths. All guidelines, documents/announcements and final winner teams' submitted materials are publicly accessible at <http://seismografos.ea.gr/>.

In the framework of LET'S STEAM, similar educational contests may be organized for schoolteachers and their students at national level in different countries or at international level in multiple countries. In addition, the STM32 board and the associated features and functionalities on MakeCode, CircuitPython and Scratch can be used for the next challenges to test the Let's STEAM approach.

INTROBOT: INTRODUCTION OF EDUCATIONAL ROBOTICS IN PRESCHOOL TEACHER TRAINING. The aim of this initiative is to promote the use of educational robotics in the degree of Preschool Education, so that future teachers develop the necessary skills for the introduction of robotics as a learning tool. Through the implementation of different lessons students have had the opportunity to observe robots' full potential to create and evaluate educational material adapted to the real needs of the educational context.

The lessons have been already carried out and now results are being analysed to characterize the impact on students, that can enhance the Let's STEAM vision and concept.

THE USE OF MOBILE DEVICES IN THE CLASSROOM. ELABORATION OF EDUCATIONAL MATERIALS THROUGH A COLLABORATIVE EXPERIENCE OF LEARNING SERVICE. This project aims at designing teaching and learning materials in an electronic format for preschool and primary education pre-service teachers. Some of the designed materials are focused on robotics, which pose a challenge for participants.



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This project may contribute to Let's STEAM by showing some of the main teachers challenges when designing robotics activities and implementing them with their students.

Other initiatives have been shared with the Let's STEAM consortium, handled in the classroom such as the following inspiring projects:

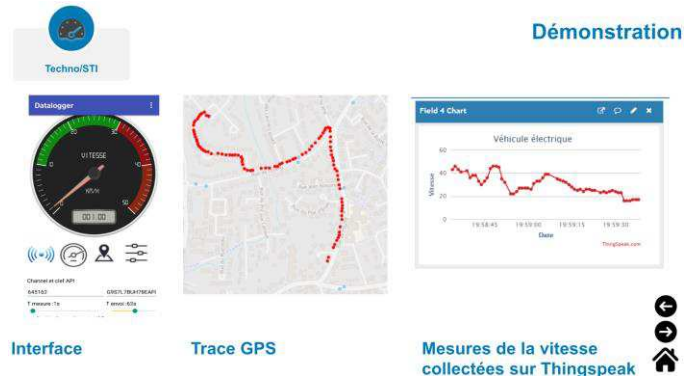


Figure 6 - Collect data from an electric vehicle in order to optimize power consumption

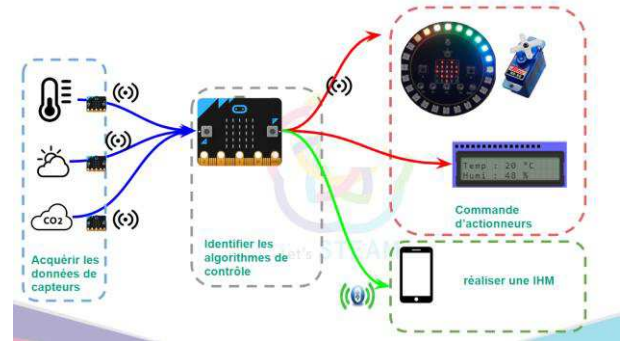


Figure 9 - From block-based to python : Air quality station

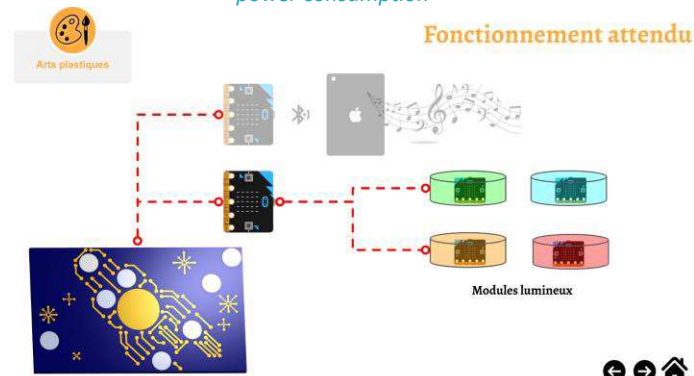


Figure 7 - Artistic project: developing an accessible for disable musical artwork

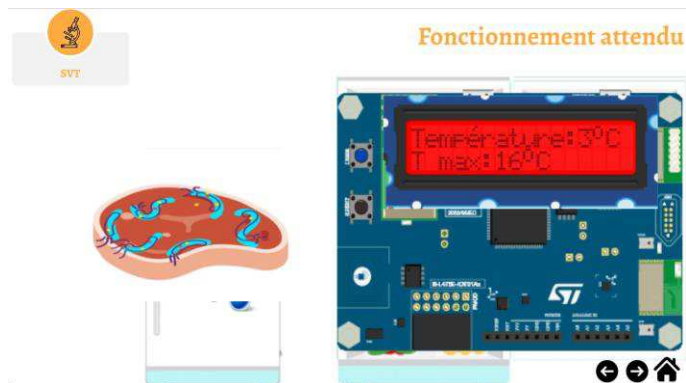
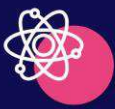


Figure 8 - Fridge alarm with STM32 board





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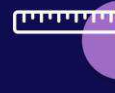
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3.7 FACILITATOR NETWORKS, POLICYMAKERS AND EU INITIATIVES— POLICY ADVOCACY AND SUPPORT

During the last decade, the European Commission (EC) has put significant effort in supporting the development of a connected economy, benefiting to all citizens. A European approach to digital transformation means empowering and including every citizen, strengthening the potential of every business and meeting global challenges with our core values. This is the purpose of the work performed by the DG Connect¹ towards the development of the “Digital Single Market”, based on several shared commitments that are considered as guiding principles for the implementation of all initiatives linked to ICT, at all stages of our current society, including:

- **Technology that works for people:** Development, deployment and uptake of technology that makes a real difference to people’s daily lives. A strong and competitive economy that masters and shapes technology in a way that respects European values.
- **A fair and competitive digital economy:** A frictionless single market, where companies of all sizes and in any sector can compete on equal terms, and can develop, market and use digital technologies, products and services at a scale that boosts their productivity and global competitiveness, and consumers can be confident that their rights are respected.
- **An open, democratic and sustainable digital society:** A trustworthy environment in which citizens are empowered in how they act and interact, and of the data they provide both online and offline. A European way to digital transformation which enhances our democratic values, respects our fundamental rights, and contributes to a sustainable, climate-neutral and resource-efficient economy.
- **Europe as a global digital player:** The EU is committed to setting global standards for emerging technologies and will remain the most open region for trade and investment in the world, provided that anyone who comes to do business here accepts and respects our rules.

Through this main policy framework, several EU initiatives have emerged. The Let’s STEAM partners are well aware that their support will be a main asset to reach policymakers and enable, beyond operational and practical courses implementation, to participate to a larger movement. Hence, several organisations have been identified as perfect relays for scaling and transferring Let’s STEAM contents and ambitions, and finding support in developing joint activities:

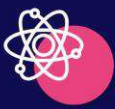


EU CODE WEEK is a grass-roots movement that celebrates creativity, problem solving and collaboration through programming and other tech activities. The idea is to make programming more visible, to show young, adults and elderly how you bring ideas to life with code, to demystify these skills and bring motivated people together to learn. EU Code Week was launched in 2013 by the Young Advisors for the Digital Agenda Europe. The European Commission supports EU Code Week as part of its strategy for a Digital Single Market. In the Digital Education Action Plan the Commission especially encourages schools to join the initiative. The goal is to reach 50% of all schools in Europe by 2020. Schools at any levels and teachers of all subjects are especially invited to participate in EU Code Week, to give the opportunity to their students to explore digital creativity and coding.

The **EU STEM COALITION** is an EU-wide network that works to build better STEM (Science, Technology, Engineering, Mathematics) education in Europe. The goal is to shape STEM education policies and practices that foster economic

¹ The Directorate-General for Communications Networks, Content and Technology is the Commission department responsible to develop a digital single market to generate smart, sustainable and inclusive growth in Europe.





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growth, opportunity and well-being for all. Together with policy makers, education providers and industry, they work on promoting new ways of delivering education and finding and sharing Evidence-based solutions to skills mismatch in STEM. From reducing shortages of STEM skilled people to fostering new ways in which educational institutions, companies and governments can cooperate, STEM coalition provides a unique forum and knowledge hub for data and analysis, best-practice sharing and direct support. The EU STEM Coalition is at the heart of EU-wide cooperation between national STEM platforms. STEM platforms are national or regional organisations tasked with the coordination and implementation of the national and regional STEM strategies and policies. They include dedicated platforms, national ministries, regional authorities, research councils, innovation agencies and university networks and many more. The platforms work closely with our European partners and a range national and regional partners to address skills mismatch in STEM throughout the EU. The EU STEM Coalition facilitates best-practice sharing between countries and regions. The network also provides direct support through so-called 'taskforces'. Previously taskforces contributed to the successful development of new national STEM strategies (e.g. the Danish Technology Pact), platforms (e.g. Hungarian STEM platform) and programmes (e.g. Spanish Jet-Net programme). The EU STEM Coalition implements a wide variety of activities and resources aimed at bringing policy makers and policy shapers together to exchange ideas, share experiences, and develop new approaches across a range of areas.

EUROPEAN SCHOOLNET is the network of 34 European Ministries of Education, based in Brussels. As a not-for-profit organisation, we aim to bring innovation in teaching and learning to our key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. They are driven by our mission to support education stakeholders in Europe in the transformation of education processes for 21st century digitalized societies. They are identifying and testing promising innovative practices, sharing evidence about their impact, and supporting the mainstreaming of teaching and learning practices aligned with 21st century standards for inclusive education. Since its founding in 1997, European Schoolnet has used its links with education ministries to help schools become effective in the pedagogical use of technology, equipping both teachers and pupils with the necessary skills to achieve in the digital society. European Schoolnet is at the forefront of the debate on how to attract more people to science and technology to address the future skills gap that Europe is facing. STEM is one of European Schoolnet's major thematic domains. We have been involved in more than 30 STEM education initiatives, financed through European Schoolnet's Ministry of Education members, industry partners, or by the European Union's funding programmes. The portfolio of European Schoolnet STEM projects ranges from teacher training ([Amgen Teach](#)) to technology-enhanced learning ([Next-Lab](#)), and science awareness for schools ([Space Awareness](#)). European Schoolnet is also leading the work of two strategic initiatives in science and mathematics education in Europe: [STEM Alliance](#) and [Scientix](#).



STEM ALLIANCE: INGENIOUS EDUCATION AND INDUSTRY. The [STEM Alliance](#) builds on the success of the [inGenious initiative](#) (2011-2014), strengthening links between STEM education and careers, involving schools all across Europe. The STEM Alliance is coordinated by European Schoolnet and [CSR Europe](#) (the business network of Corporate Social Responsibility). With the support of 15 major industries and private partners, the STEM Alliance - for inGenious Education and Industry - promotes STEM jobs in all industrial sectors and contributes to building a STEM-skilled workforce. The STEM Alliance joins forces to improve and promote existing industry-education STEM collaboration (at national, European and global levels) and supports innovation in approaches to STEM teaching.

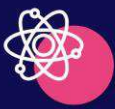


SCIENTIX: THE COMMUNITY FOR SCIENCE EDUCATION IN EUROPE. The [Scientix](#) project promotes teaching materials from STEM research projects and supports Europe-wide collaboration among science and maths teachers, researchers, policymakers and other professionals in STEM education. Originally, an initiative of the European Commission's Directorate-General for Research and Innovation, the project receives financial support from the seventh Framework Programme of the European Union.



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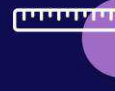
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WITEC was formed as a network in 1988. After more than ten years of networking and project activities related to women and STEM it established itself as a non-profit European association in May 2001. WITEC has the following aims at European level:

- **TO INCREASE** the number of girls and women studying STEM subjects and to help them progress into related careers.
- **TO DEVELOP** women's technical and entrepreneurial skills through training initiatives and projects.
- **TO CREATE** information exchanges and networking opportunities for women in STEM.
- **TO PROMOTE** and support research in areas relating to women in STEM.
- **TO SUPPORT** initiatives to promote the Gender Mainstreaming Policy.
- **TO PROMOTE** regional, national and international awareness and interest in this field.

SCIENCE ON STAGE EUROPE is a network for STEM teachers focusing on the exchange of best practice teaching ideas. The ultimate goal is to improve STEM teaching by supporting educators in their professional development and growth. By spreading innovative teaching concepts among Europe's science teachers, we enable more students to gain the affordable skills they need for a challenging future and encourage them to consider a career in science, ICT or engineering. Since its launch in 2000, Science on Stage has reached about 100,000 teachers and teacher trainers in over 30 countries (extrapolation by country representatives in 2011 and 2015). A network of National Steering Committees in these countries provides the interface to their national STEM teacher communities. Science on Stage Europe is the umbrella organisation that supports the 34 member countries with the realisation of their activities and helps with coordination of the national festivals. The broadening of the network, the acquisition of new members and various administrative tasks are carried out by the headquarters in Berlin.

The aim of the '**EUROPEAN EDUCATIONAL RESEARCH ASSOCIATION**' (EERA) is to further high quality educational research for the benefit of education and society. High quality research not only acknowledges its own context but also recognises wider, transnational contexts with their social, cultural and political similarities and differences. The association's activities, such as the annual conference, season schools for emerging researchers and publishing, build on and promote free and open dialogue and critical discussion and take a comprehensive and interdisciplinary approach to theory, methods and research ethics. EERA membership is made up of more than 35 national and regional Educational Research Associations from all parts of Europe. It is governed by the Council and the Executive Committee. The academic work is organised in thematic networks. From 1994 to 2008 EERA was constituted as a non-profit organisation under British Law and was based in Scotland. EERA is dependent on the participation of the national associations to take forward its mission of promoting educational research in Europe and of fostering cooperation between associations of educational researchers.

3.8 SUPPORTING ORGANISATIONS – GETTING QUESTIONED AND IMPROVING THE CONTENTS

In addition to projects and EU initiatives, several organisations have been identified for their relevance to the project topic, proven by signing a letter of support. The Synergy strategy should include their active participation in **brainstorming on the project content and providing access to additional dissemination targets**. Their profiles are the following:

Table 2 - List of supporting organisations

STMICROELECTRONICS	STMicroelectronics is a world leader in providing the semiconductor solutions that make a positive contribution to people's lives, today and into the future. Nowadays, ST is developing a new IoT board completely designed for educational purpose. If the platforms developed during the project will be able to work with all IoT boards, ST will provide its technical supports in the delivery of enough boards for the demonstration to be efficient. In addition, ST is completely dedicated to the educational purpose nowadays and will be seen as a sponsor for the project development.
UNIVERSITY OF MONDRAGON	The University of Mondragon is developing the Digital advanced Lab dedicated to schools and citizens, providing training and experimentation facilities. Within this lab, the University has been involved in promising initiatives that will be used for the project such





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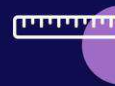
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	as the school digital diagnosis project and their experience in accompanying classrooms in the field of digitalisation. In addition, the lab is involved in initiatives that will be useful for the project such as the European CodeWeek with Itziar Garcia Blazquez, representative from Mondragon, being one of the ambassadors, or within EDUTEC, association to promote the development of educational technologies and digital tools in education).
UNIVERSITY OF CYPRUS	The University of Cyprus will be involved through its Learning in Science Group that will provide its expertise in in educational assessment and evaluation as well as partnerships with schools in technology-enhanced science learning. In addition, the representative of the University of Cyprus is also involved in the ESERA conference (European Science Education Research Association) that will be a great place to disseminate the project results.
BBK BOOTCAMP	BBK Bootcamp is an initiative dedicated to training regarding coding and digital skills. The association is strongly involved in delivering the best competencies in terms of development competences. Within the project, they can easily bring their technical background and insights to the contents of the training of teachers. In addition, the team in BBK Bootcamp is also involved as ambassador within the EU CodeWeek.
LULEA MAKERSPACE	LULEA Makerspace will give perspective to the project in terms of integration of all the students' requirements regarding technologies and digital code, especially regarding girls education. This will enable giving the project more insights about potential barriers at classroom level to enable working on this motivation axis within the project. In addition, Agneta Hedenström, project representative, is also a CodeWeek ambassador.



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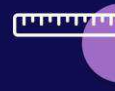
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4. ACTION PLAN LINKED TO THE IDENTIFIED INITIATIVES

This Action Plan summarizes the planning and monitoring of the synergies to be developed with the partners and projects identified above. These synergies include **regular exchange of information, joint participation in relevant conferences and policy events, alignment of dissemination activities and social media campaigns, joint preparation of policy briefs or exchange and consolidation of results for related case studies.**

Synergy activities also seek to contribute to the identification of STEAM and programming practices, to be integrated in the courses of the ToT Let's STEAM programme and highlighted in the replication plan.

4.1 OVERVIEW OF THE ACTION PLAN

The Synergy Action Plan is based on three specific activities to be developed during the project. Additional opportunities might emerge from the development of these actions.

EXCHANGE OF INFORMATION ON PROJECT PROGRESS AND RESULTS

Several projects have been identified as stated above for developing exchange of information on project outcomes. Especially, all the projects aiming at i) developing ToT programmes in the field of programming and ICT practices, ii) projects enabling to develop computational thinking activities within schools and iii) project with a specific focus on either STEAM as a whole and STEAM inclusiveness especially towards girls. If cross-activities including co-development of contents would happen during the projects lifetime or beyond, discussions will be opened on the possibility to develop joint-papers or joint-presentation of the results. Such activities will highly prove the efficiency of the synergy strategies at EU level.

PARTICIPATION TO PROJECT MEETINGS AND/OR EXTERNAL ADVISORY BOARD MEETINGS OF OTHER PROJECTS

Whenever feasible, attending Project Progress meetings of the above-mentioned consortia (and potentially new ones to be funded during the project lifetime) will be organised. This will enable active and regular follow-up of each projects' evolution. In addition, each partner will inform the coordinator and Communication leader in case they are invited to join a new project External Advisory Board or project to identify potential synergies with Let's STEAM. Eventually, regular skype meetings with specific projects (especially the ones identified above) will be organised either by WP leaders to discuss respectively about the technical results, or by the Communication Officer to exchange about the overall synergy actions.

JOINT PARTICIPATION IN CONFERENCES AND EVENTS TO PROMOTE THE VISIBILITY AND OUTPUTS OF THE PROJECTS

The project Communication Officer will be regularly communicating with the Communication WP leader of the identified projects quoted above. Exchanges on the six months to come action plan in terms of events participation will be regularly shared to identify common conferences and workshops to meet, discuss and promote each other results. Other local opportunities may present themselves and, depending on available projects results, will be explored in due time. At this stage, the following events have been identified with high potential of synergies and cross-cooperation on increasing visibility of projects' results:

4.2 ALIGNMENT OF OTHER COMMUNICATION AND DISSEMINATION ACTIVITIES

In addition to the specific activities identified above, the Communication officer will start taking direct contacts with the Communication WP leader of diverse undergoing projects. These contacts have the aim to identify day-to-day joint-communication activities especially:

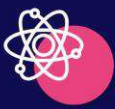
- **Joint twitter and social-media campaigns** – Most of the identified projects are active on Twitter, Facebook and/or LinkedIn. Specific joint campaigns around key project results or events, such as to improve their visibility will be organised regularly.
- **Specific page on the website dedicated to the Let's STEAM network projects**
- **Organisation of a joint event** can be foreseen if the opportunity is identified.



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4.3 ACTION PLAN PER ACTOR

The following table shows the proposed strategies to exploit synergies with the different identified stakeholder.

Table 3 - Action Plan per actor

Actor	Activities
Erasmus + Strategic Partnerships and other projects	<ul style="list-style-type: none"> – Exchange of knowledge produced – Participation to physical and skype meetings to brainstorm on the development of courses and programming platforms’ functionalities – Regular exchange of information with regard to project results and events – Participation, where possible and relevant, in partner events – Invitation to participate to Let’s STEAM meetings and events – Potential joint publication, organisation and participation to joint event, joint presentation – Dissemination of the Let’s STEAM events, newsletter and other materials, and vice versa – Cross-dissemination on social networks
Other EU-funded projects	<ul style="list-style-type: none"> – Regular exchange of information with regard to project results and events – Dissemination of the Let’s STEAM events, newsletter and other materials, and vice versa – Cross-dissemination on social networks
EU CodeWeek and STEAM EU organisations	<ul style="list-style-type: none"> – Regularly update information on the Let’s STEAM project during the EU CodeWeek events, brokerage sessions and workshops – Specific communication towards the members of the organisations identified (such as CodeWeek ambassadors) as relevant to the Let’s STEAM project – Participation in EU events
Members of the External Advisory Board	<ul style="list-style-type: none"> – Exchange of knowledge, contents and functionalities produced by Let’s STEAM – Participation to physical and skype meetings to brainstorm on the activities and provide additional inputs and feedback on the project deliverables and results – Regular exchange of information with regard to project results and events – Invitation to participate to Let’s STEAM meetings and events
National projects	<ul style="list-style-type: none"> – Exchange of knowledge produced – Regular exchange of information with regard to project results and events – Dissemination of the Let’s STEAM events, newsletter and other materials, and vice versa – Cross-dissemination on social networks

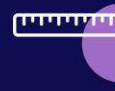
4.4 MONITORING OF THE SYNERGY ACTION PLAN OUTCOMES

Synergy exploitation will be monitored and evaluated against the criteria listed in the table below by the project coordinator (AMU) and the Communication Officer. The adopted metrics and the periodicity will vary according to specific synergy and actors identified.

Table 4 - Monitoring of synergy outcomes

Synergy outcomes	Stakeholders	Indicators	Key actions for success
KNOWLEDGE CO CREATION <i>Exchange of knowledge produced</i> <i>Participation to physical and skype meetings to brainstorm on the development of the courses and platforms’ functionalities</i> <i>Regular exchange of information with regard to project results and events</i> <i>Participation in working groups</i>	EU project with similar scope EU CodeWeek and other EU initiatives EAB members	Number of effective contacts established; Number and types of information exchange channels implemented Number of brainstorming sessions organised Number of contacts taken in the focus groups of the diverse initiatives Number of participations to CodeWeek and EU events	Early identification of key partners and key people in the different initiatives Early first contacts to be taken from all the partners Remind the partners to provide information regarding the other projects they are involved in



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		Number of meetings attended and diversity of working groups	
PROJECT OFFICIAL MEETINGS <i>Participation, where possible and relevant, in partner meetings Invitation to participate to Let's STEAM meetings and events</i>	EU project with similar scope	Number of attended meetings	Remind the coordinator to provide time for participating to on-line meetings with other projects
JOINT PUBLICATION AND OTHER JOINT ACTIVITIES <i>Potential joint publication, organisation and participation to joint event, joint presentation</i>	EU project with similar scope	Joint presentation contrasting methods and results. Number of events	Ensuring rules for co-writing
CROSS-DISSEMINATION CAMPAIGN <i>Regular updates of the Let's STEAM results within the communication materials of linked initiatives, clusters and projects</i>	All stakeholders with a special focus on STEAM education, coding and programming for Science, computational thinking and creativity	View, visits and/or downloads of Let's STEAM information Number of articles published Number of participations to events	Reminding the partners to actively participate in the clusters and attend the relevant meetings Send accurate and relevant publications of the project outcome, on time to be published on the clusters' newsletters
PARTICIPATION TO EVENTS <i>International conferences, events of the EC, local events and challenges</i>	EU CodeWeek, local initiatives, International events and actors	Number of events	Early identification of key events; Coordinate participation of the Let's STEAM partners
CROSS-DISSEMINATION ON SOCIAL NETWORKS	All stakeholders	Analysis of the impacts of the campaigns (users reached, shares, new follows, etc.) of the posts published by Let's STEAM and the posts published on the project by the external network	Regularly remind partners to actively participate in the campaigns with their official accounts as provider of content or relay for the information created by the Communication Officer





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5. CONCLUSION

From the work performed in the identification of linked initiatives, the partners have reached a deep knowledge on the context in which the project is evolving. The analysis of the project background has led to several pillars for Let's STEAM implementation, foreseen as guiding principles for the implementation of our curriculum:

1. Let's STEAM pillar #1: Provide an inquiry-based approach.
2. Let's STEAM pillar #2: Develop a full training of teachers' programme structured around the teachers' needs, active pedagogical approaches, inquiry-based methods.
3. Let's STEAM pillar #3: Provide practical skills to teachers and students from basics to the development of a teacher-contributor position.
4. Let's STEAM pillar #4: Develop the knowledge of the teachers on how programming can bring creativity, based on a computational thinking vision of coding.
5. Let's STEAM pillar #5: Assess the project results under an evaluation scheme integrating gender equity, inclusiveness and well-being.

Hence, these concepts and commitments should be integrated in the several outputs as guidelines for the diverse activities especially through the following recommendations:

1. **Recommendation #1 – Definition of the pedagogical scenarios:** The pedagogical scenarios should include both inquiry-based approach and basics of programming to enable reaching the global aim of the Let's STEAM project. If one of the approaches is missing, Let's STEAM will lack capacity to empower the teachers by working on both motivation means and skills' framework.
2. **Recommendation #2 – Implementation of communication materials to motivate the teachers:** The Let's STEAM approach should be supported by inspiring examples based on a creativity scheme. This can be developed by capitalising on this database, disseminating the results of best practices projects.
3. **Recommendation #3 – Do not underestimate the needs for providing basics of programming courses:** The high number of projects identified aiming at developing programming simple courses highlights the needs for targeting these skills for the teachers, independently from their self-assessment of digital skills, that can be biased by emotional and behavioural patterns.
4. **Recommendation #4 – Implement non-technological assessment grids:** Even if it will be crucial to assess the concrete technical skills acquired by the teachers, Let's STEAM is ambitioning to participate to increasing motivation and well-being of the students by tackling inclusiveness and gender issue. This aspect should be integrated as a core dedicated part of the assessment model.

Eventually, this database is providing a first Action Plan of potential networking and clustering activities, that can ease, by brainstorming and content exchange, the achievement of the Let's STEAM objectives and the integration of the recommendations quoted above. Updates version of this database of initiatives and linked Action Plan will be produced on an annual basis to report all the networking activities performed and evaluate the accomplishment of these actions.



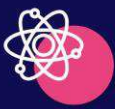
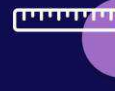
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LET'S STEAM
CREATIVITY
INTERDISCIPLINARITY
CITIZEN SCIENCE

6. ANNEXE 1 – FULL DATABASE

ERASMUS + STRATEGIC PARTNERSHIPS		
Interdisciplinary and Collaborative themAtic leaRning of technOlogy and Science		
Strategic Partnerships for school education	Coord: Wijkmanska gymnasiet (Sweden)	2016 – 2018
<p>ICAROS stands for Interdisciplinary and Collaborative themAtic leaRning of technOlogy and Science. It is a year-long educational project implemented annually since 2016 as a dedicated extra-curriculum student-club of Ellinogermaniki Agogi's High School. ICAROS project is aiming at enhancing educational practices that will lead to better motivated students with improved study-goal achievements. The assumption is that this can be done through thematic learning with an entrepreneurial learning approach, and student-led knowledge development through experimentation and real-world problem solving. ICAROS student-club and its activities are focusing on the design, development, testing and operation of x-quadrotor drones equipped with cameras and sensors. The project thus makes use of modern technology that captures the imagination of students, as well as innovative methods spanning over several disciplines, to demonstrate the real-world applicability of Science, Technology, Engineering and Mathematics (STEM) and other related subjects. The project also aims to inspire students to develop an entrepreneurial approach to science, research and technology and to encourage independent knowledge development, DIY and making.</p>		
Using retro gaming consoles to revive hands on play and promote STEM		
Strategic Partnerships for school education	Coord: Civic Computing Limited (UK)	2018 – 2020
<p>RETROSTEM is an Erasmus+ project (2018-1-UK01-KA201-048152) run by a consortium of partners from education, academia and industry. RETROSTEM's approach is to promote the acquisition of skills of teachers and students in the digital era by developing innovative learning practices supported by a Raspberry Pi based console and DIY electronics kits. This aims to support teachers in delivering subjects extending their present knowledge and enhance their understanding on how to effectively engage students to the learning process of programming concepts and STEM subjects through hands-on play in a retro design game console and electronic kits. The project designed a hands-on console and developed a comprehensive of step-by-step instructions, examples of educational activities and training modules for teachers and students of primary and secondary education based on Scratch and Python programming languages and on Minecraft environment. These are implemented and piloted at small scale before they are refined and released as final intellectual outputs of the project. They are also translated and are available in four different languages, namely in English, Greek, Polish and Romanian.</p>		
Code, Content Creation and Culture for Digital Education		
Strategic Partnerships for adult education	Coord: PERSPECTIVES (Belgium)	2016 – 2019
<p>Production of open educational resources (OERs) to be used for professional purposes in the area of ICT learning, with adults and students. These OERs are structured in 44 lessons in the field of programming, narratives methodologies (storytelling), rich media production (photography, video and sound), and digital. The lessons, representing a 120 hrs course, can be accessed by two different paths: a non-formal course (designed for adult education), structured in 4 themes (audiovisual, storytelling, creative code, digital art), or a formal course (designed for formal students) structured in 3 levels (referring to a Borges' story) on one single multilingual platform (4cde.eu). A Skills Reference Guide accompany the lessons and the platform includes all educational resources, pedagogical information, and assessment processes.</p>		
Coding skill development using robotics for young Europeans		
Strategic Partnerships for vocational education and training	Coord: Baltic Orbis UAB (Lithuania)	2015 – 2017
<p>International training of European Community IT teachers for the use of robotics as coding learning facilitator. This project aims to validate the methodologies through experimental tests and thus be able to present evidence of its</p>		

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advantages for teaching and learning coding. During project were developed teaching methodology inspired by LEGO® Education and universal lessons templates and it could be used to teach not only coding but also other VET subjects and all STEM subjects.

Code Your Life!

Strategic Partnerships for Schools Only

Coord: Collège Sainte Thérèse

2017 - 2019

The project is designed to raise awareness and increase the knowledge of algorithmic thinking which is thought to be one of the key abilities that children should achieve in information and communication technology education at school and in their daily life. We plan to teach several activities on algorithm which children can do in their daily life and activities on coding which children can practice using algorithmic thinking. For instance, children will write algorithms about emergencies such as what they should do in case of an earthquake or they will write algorithms about their daily life habits such as how they cross a road in traffic to relate algorithmic thinking to everyday activities or they fix a puzzle that has been solved incorrectly to identify errors and disordered blocks in a program. After learning algorithmic thinking, they will start to write codes to create some materials/animations such as designing greetings cards for special days, animating some stories, building some lesson games.

Computational thinking and Digital skills in European education for all

Strategic Partnerships for Schools Only

Coord: Istituto Comprensivo 'Carrara e Paesi a Monte' (Italy)

2017 - 2019

The project "CO.D.E4all" wants to create a network of school across Europe to develop the "21st Century Skills"; such as creativity and innovation, critical thinking and problem solving, digital competence, teamwork and collaboration in virtual teams, multiple languages and cultural awareness. Our aim is to develop and share good practices and innovative educational ways to use coding and new technologies at school, for students from 3 to 13 years old , in order to create a computational thinking vertical curriculum . Our aim is also to build a Teachers' "Code European community", where we can: -Share good coding and computer science practices that we are using in our classroom now. - Inform other teachers, public, families about our project. - Collaborate with different nations researchers, technology developers, state, and local leaders to disseminate the idea that technology is advanced in ways that promote young children's healthy development and learning.

Zaprogramuj swoją przyszłość

Strategic Partnerships for Schools Only

Coord: Gimnazjum nr 3 im. Unii Europejskiej (Poland)

2016 – 2018

The aim of the project was to develop information skills among students and teachers by means of a great variety of ICT tools used in the project. Teachers of partnership schools exchanged their knowledge about methods and tools of teaching programming from the first class of the primary school, teaching computational thinking and using ICT tools in teaching and learning. The project was also the initiative to build the motivation to learn science among women. During visits pupils took part in activities concerning the topic of the project, they took part in workshops connected with learning programming and robotics, using information-communication technology to solving problems and they visited places connected with new technologies.

Code to Create new knowledge using programming in primary school

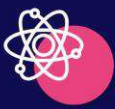
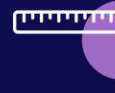
Strategic Partnerships for Schools Only

Coord: Glasbergsskolan (Sweden)

2016 – 2018

The partners from three different countries has worked together to learn from each other's practices, both students and teachers regarding; 1. Programming and Maths- using code to solve problems 2. Programming and Technology- using code to create something new 3. Programming and Crafts- using code to create something new The project has also focused on what the curriculum says about code/programming and the result from best practice in this project has become an online course/lesson activities to support other schools implementing code/programming in primary school. The results from this project has been in different levels. The three participating schools have had a great



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change of experience working together in this project based on developing our own ability to teach programming and coding to our students. The partners in this project have raised their confidence and awareness for both cultural differences in our countries but also in how you can work with digital tools and computational thinking. We have also during the project worked on and created a free website where we have collected our best activities we have tried out during the project.

Creation of Digital Environments for Education

Strategic Partnerships for Schools Only

Coord: Sariyer Ortaokulu (Turkey)

2017 – 2019

The principal objective is to promote code writing as a relatively new practice that promises to support teachers and learners to create knowledge and solve conceptual problems with the support of digital tools. The core activities will be to:

- Develop and refine the existing curriculum and tools, drawing on the pedagogical and technical experiences of our partnership through the project activities.
- Apply the curriculum some specific educational contexts with a range of learners to explore and test its potential to enhance the teaching of computing/programming and other subjects
- Refine the framework and tools in light of its application in educational contexts and launch it as an open educational resource
- Conduct experimental studies to evaluate the efficacy of the curriculum for supporting learning
- Dissemination of the framework and tools as mentioned below.

Advancing programming, STEM and IoT understanding in the classroom through DIY computer kits

Strategic Partnerships for school education

Coord: ECAM-EPMI (France)

2019 - 2021

The main objective will be to elaborate and validate a guide for building, configuring and using the DIY computer in the classroom; Design and develop a curriculum and lesson plans for using the STEMKIT DIY computer, based on Raspberry Pi edition, to teach children programming through the creation of Minecraft Pi games to be played on the console also in combination with electronic gadgets the children will build and which will enhance understanding of programming concepts (e.g. traffic lights units for experimenting with loops) or STEM (e.g. ambulance with siren controlled by the console to demonstrate the Doppler effect); Design electronics kits to be used in support of the curriculum and to be built by children to use with the console as an educational hands-on play approach; Prepare a social learning environment utilizing motivational workflows such as the recognition of achievements through the awarding of badges, for the delivery of the curriculum to teachers/educators and for skills retention

Early Coding in Schools

Strategic Partnerships for school education

Coord: Escola Básica do 1º com Pré-escolar da Cruz de Carvalho (Portugal)

2018 – 2020

The goal of the project Early Coding in Schools is to spread the learning of computational logic and coding skills in schools to young learners (ages 6-14) while instilling knowledge and appreciation for their home countries. We intend to develop a learning environment that is suitable for young learners in which they can be guided by their teachers. This environment should be easy for busy teachers to use without requiring a background in programming themselves and without too much preparation. The environment will be fun for the students so they are motivated to use it and simple enough for teachers to add to their current classroom curricula. The program will also encourage learners to explore a virtual map of their home region. In order to gain access to content regarding notable features of the map the students must learn small coding tasks which let them travel from one place to the next.

Enhancing coding skills in European schools

Strategic Partnerships for school education

Coord: Codeforall,lda (Portugal)

2016 - 2018

The Junior Code Academy emerges within start-ups and wants to offer an innovative and engaging training approach to coding, seeking to enhance learning and to identify concrete ways of how innovative pedagogic use of ICT can help, particularly to motivate and to attract potential dropouts back to educational system and to be actively involved in learning. It is therefore important to explore the potential of ICT and computer programming, transforming it into a powerful tool that provides a motivational learning environment to young students. With Junior Code Academy we



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intend to put this power into the hands and hearts of the students. In detail, the project mission is to expand the minds of young students (10-15 years old) and provide them with the right set of tools and skills to meet the needs of tomorrow, implementing a learning strategy under the scope of the demands of 21st century key competences, such as logical reasoning and problem solving.

CODING ALL TOGETHER

Strategic Partnerships for school education

Coord: Liceul Teoretic Nicolae Balcescu Medgidia (Romania)

2019 – 2021

The project promotes collaboration between different educational organizations, university and civil society institution. All the project participants are composed of professional persons. Each project partner is chosen by consideration of their background and experiences. In the project each of the partner will create their own materials by coding, at the end of the project all the project activities and results will be exhibited at the projects' last LTT mobility. Within international content all the project partners will exchange cultural, social and language features. At the end of the project we are expecting innovative solutions. All the project activities will be gathered in an e-book.

KidsCodr - We teach kids programming

Strategic Partnerships for school education

Coord: Check IT s.r.o. (Slovakia)

2016 - 2018

KidsCodr project created a complete training curriculum to teach digital skills for children in age 6-14 years. The curriculum is divided into two parts. The software part where learning takes place in various programs, applications or directly in the programming language. This part is composed of the training modules like Scratch Junior, Scratch, Kodulab, MIT App Inventor, Javascript Games and Minecraft. The hardware part is focused on programming robots and hardware, and this allows students to receive immediate feedback on their work in a real environment (move of the robot, activate functions, etc.). A web application kidscodr.eu, will unite at a glance all the educational materials and creates a system for communication and development of further KidsCodr activities.

Code Name Robot

Strategic Partnerships for school education

Coord: Karatay Ilce Milli Egitim Mudurlugu (Turkey)

2018 – 2020

By developing coding techniques for students who learn robotic coding (age is not important) for the first time, our target groups aim at gaining knowledge of software first, then algorithm, and then programming language training and finally coding skills. With this project, students and teachers will see different coding training methodologies. They will develop new coding techniques by exchanging ideas. They will synchronously perform the robotic coding activities they planned. When doing the same activities, the studies will take place in a tournament atmosphere and this will motivate the students. One of the most concrete achievements of coding training is to reveal existing creative design talents. In the last decade, student-centered curriculum has gained weight. The activities that are appropriate to the interests and core competencies of the students are recommended. There are many extracurricular activities in our pilot school, İzzet Bezirci Elementary School, but the most interesting and most favoured one is robotics coding training.

DIVERSELY CODING: coding for improving the social inclusion

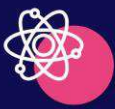
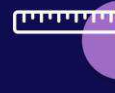
Strategic Partnerships for school education

Coord: Associazione Ergon a favore dei Sordi (Italy)

2018 – 2020

The project aims to develop a training course on "Diverse coding", enabling people with specific disabilities: Adults (Age 18-60 years) with hearing disorders to increase their digital skills and programming, with a methodology that applies European recommendations to validate non-formal and informal learning to facilitate recognition and transfer of results. Furthermore, implementing a specific design of the training path and the development of contents. The project is aimed at people who work or who are unemployed with hearing disorders to improve their social integration and improve the informal educational path in such an innovative and formative context.



**S****T****E****A****M****FREE TO CODE: improving digital and coding skills for inmates****Strategic Partnerships for school education****Coord:** European Strategies Consulting (Romania)**2018 – 2020**

The FREE to CODE project has the ambitious goal of using digital skills and computer programming as a means of human development that can help adult European prisoners to re-enter society with a resale expertise. The project intends to develop an innovative training programme on coding for learners detained (men, at least graduated and with a short-time sentence, to prepare them to be reintegrated into the society), with the aim to favour the development of their digital skills and in turn their transversal skills, particularly problem solving. The project aims at transparency and recognition of skills and qualifications; application of the European recommendations to validate the non-formal and informal learning with the improvement of their digital and programming skills in an informal and formal learning environment.

Ladies Code Their Future**Strategic Partnerships for school education****Coord:** Fundatia Centrul Educational Spektrum (Romania)**2017 – 2019**

The direct target group of the LIFT project were “disadvantaged women”, defined, for the purpose of this project, as women who face isolation and hardship as a result of them having a low-level of education, being unemployed or living in a rural location where their basic needs for services, employment and education are currently not being met. The project consortium developed the products addressed to the direct target group in various languages (Dutch, English, Hungarian, Spanish, Portuguese, Romanian) for better accessibility: we are aware that English is a “must” for programming, but low level of English language competence should not be an obstacle in making a decision to start learning IT. Their intention of building a career in ICT motivated women taking part in our pilot activities to start developing their language skills too, concomitantly with starting a course in ICT. All basic IT training/ coding programmes emphasise that anyone can learn how to program as long as they are willing to put in the time and effort. The LIFT project team built its curriculum, learning platform and “virtual tour” of women role-models in the ICT sector upon this positive, optimistic presumption, encouraging women to dare to think about entering the ICT job market, offering them basic introduction to the world of ICT and coding: our platform being available not only in English but also in Dutch, in Hungarian, Italian, in Portuguese and in Spanish.

Promoting Social Inclusion through Coding and ICT skills**Strategic Partnerships for school education****Coord:** Asociacion de Personas con Discapacidad Verdiblanca (Spain)**2017 – 2019**

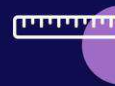
This partnership intended to provide access to quality IT learning and to help persons AROPE to get out of the education-poverty trap where they are kept due to prejudices and low quality IT education by offering better chances to access lifelong learning opportunities and employment In the ICT sector. Thus the objectives of Code-n-Social were:

- Raise awareness about the value of empowering people at risk of social exclusion in ICT and coding to find their way in the labour market inspiring other persons at risk of social exclusion targets to consider careers in the digital technology market
- Compare good practices, showcase inventions, developments, innovations, successful tangible products coming from the community of people at risk of social exclusion and join the EU Code Week in 2018
- Build an innovative curriculum and enable people at risk of social exclusion to improve their confidence through a brand new learning and role modelling program
- Broaden the horizons of the target learners to experience innovation being inspired by the experience of others in a similar situation to theirs’
- Support the education and training community to empower in a motivational and engaging way those at risk of social exclusion through ICT up skilling and confidence building.

Fostering Coding Education in Europe**Strategic Partnerships for school education****Coord:** FUNDACION PARA EL DESARROLLO Y LA INNOVACION**2015 – 2017**

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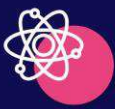
	TECNOLOGICA (Spain)	
<p>The project has delivered an innovative training system based on interactive tools, helping adults to acquire basic knowledge of computer programming and promote an active and conscious usage of IT tools in households. These training materials have covered a wide range from the basics of digitalization, computational thinking and using everyday examples to develop algorithms (targeted to non-digital users) to the actual development of code through the use programming languages and through the use of specific tools and games targeted to coding with children. The developed materials will help users improve their digital and transversal skills and their ability to support their children in the use of ICT.</p>		
Computational Thinking and Acting		
Strategic Partnerships for higher education	Coord: JYVASKYLAN YLIOPISTO (Finland)	2019 – 2022
<p>The overall goal is to develop new solutions for learning and teaching ICT, in particular Computational Thinking and problem solving into primary schools (grade 3-6). The main idea is to use a "physical approach" which we interpret in two ways: 1) Devices such as small robots are used to create haptic, tangible experiences (Richard, 2008; Blikstein, 2013), 2) ICT should be connected with physical real-life activities to avoid that computers are just perceived as a passive, seated activity.</p>		
Computing Competences. Innovative learning approach for non-IT students		
Strategic Partnerships for higher education	Coord: UNIWERSYTET SLASKI (Poland)	2018 – 2021
<p>The project aims at increasing innovation and interdisciplinarity of higher education through the development and evaluation of effectiveness in at least 4 European Universities of the programming course for non-IT students until 07.2021 The project will produce</p> <ul style="list-style-type: none"> - An interactive online manual, consisting of 2: Part A, part 12 introductory lessons, part B will be of 5 parallel topics, 6 lessons long (30 lessons). - Programming exercises (5 tasks for each lesson, that is 60 tasks for parts A and 150 for part B) - System for automated evaluation and grading 		
Tools for Teaching Quantitative Thinking		
Strategic Partnerships for higher education	Coord: UNIVERSITY OF GLASGOW (UK)	2015 – 2018
<p>The TquanT project and strategic partnership is based on a consortium of 12 European universities leading the way to teach quantitative skills and programming competences in the social sciences. We organised three blended mobility activities in different countries: Portugal 2016, Austria 2017, and the United Kingdom 2018. The 8-day activities combined traditional teaching in classrooms with innovative e-learning techniques to teach quantitative skills and programming competences to a group of 50+ international students each year. During each blended mobility we developed new interactive software tools (Shiny/RStudio) for teaching various aspects of quantitative thinking. These tools were used to establish adaptive tutorials and open-access e-learning courses targeting students at all levels of education, accessible to disadvantaged students from diverse cultural and geographic backgrounds, but also to adult learners, teachers and the general public. These interactive tools and online courses as well as other teaching resources are accessible on our central website https://www.tquant.eu.</p>		
CoderDojo Training in ICT Programming Skills		
Strategic Partnerships addressing more than one field	Coord: CORK INSTITUTE OF TECHNOLOGY (Ireland)	2014 – 2017
<p>The project aims to address the European wide deficit in young people's uptake of Science, Technology, Engineering and Mathematics. The objectives of the project are to support the growth of the Coderdojo approach, as a means to increase STEM take-up by young people. CoderDojo is a global, volunteer led movement which runs not for profit coding clubs for young people. In the clubs, young people learn how to code, develop websites, apps, programs, games and more. Specifically, the project will</p>		



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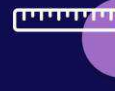
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1. Develop best practices drawn from the experience of CoderDojo clubs globally
2. Examine means by which evidence of learning gained by CoderDojo participants might be recognized
3. Develop a Toolkit which will facilitate the establishment of new CoderDojo groups- known as "Dojos".

CODING AND YOUTH: AN INNOVATIVE PROGRAMME IN THE DIGITAL ERA

Strategic Partnerships for youth

Coord: CYPRUS COMPUTER SOCIETY (Cyprus)

2016 – 2017

The CODE@YOUTH project the project pioneers in proposing to develop, implement and evaluate a comprehensive challenging summer coding programme that will focus on introducing young people (13-17 yrs) to the world of CODING and COMPUTING, by using in a constructive way teenagers' long summer vacations, in order to teach them in a creative way how to code and to present them, through first-hand experience (visits) the spectrum of fields they can follow to study and later on work in the digital area. It aims to introduce QUALITY STANDARDS (coding framework with benchmark and indicators), EVIDENCE-BASED DATA and MECHANISMS for the VALIDATION of the acquired coding competences for young people and youth workers (YW) through another innovative system the OPEN BADGES. This is an added value to the project as the coding skills will be made VISIBLE, TRANSPARENT and ACCESSIBLE through the young people's and youth workers' active involvement in the design of an eco-system. It develops a new on-line platform for e-learning, with in-built functions of interconnectivity, communication and provision of support through the e-Academy, where experts and stakeholder can register to offer guidance and support, an e-DATABANK with useful e-tools, reports, good practices etc. for review and the e-COMMUNITY where young people and YW can share their experiences and learn from each other through the 'digital profile' to be created.

OTHER ERASMUS + PROJECTS

Step by step, code by code - a successful design

Learning Mobility of Individuals

Coord: VSEEE Konstantin Fotinov (Bulgaria)

2016 - 2017

The project "Step by step, code by code - a successful design" is aimed towards students majoring in Software and Computer Engineering and Technology from 10th and 11th grade with intensive study of English language. Twenty students will participate in the project accompanied by two teachers and they will perform mobility for three weeks in professional training center in Schkeuditz, Leipzig, Germany. The mobility will be a compilation of vocational training, personal development and improvement and enhancement of cultural education. The main goal of the project is learning and developing skills for using language HTML5, CSS3 and JavaScript in the development of modern functional and dynamic web sites and web applications. The formula of success for implementing the main goal will be to obtain a combination of knowledge, skills and professional competencies, their recognition and realization later.

Arduino Card Programming Applications

Learning Mobility of Individuals

Coord: Sehit Ramazan Akyurek Mesleki ve Teknik Anadolu Lisesi (Turkey)

2018 – 2019

Arduino is an open source development platform built to perform your electronic projects. Two-sided development with Arduino is being achieved. Projects are being created by writing code on the circuit and through the Arduino IDE. For example, DC, step and servo motor controls can be performed by Arduino. This control can be done with the software embedded into Arduino. The most important component that makes Arduino so popular is the Arduino libraries, which allow anyone to program without having to have detailed knowledge of the microcontroller. AKARTPU, which is a project topic of ours, is used in communication systems, smart home technologies, power transmission and electric machines, voltage regulator circuits, solar and wind energy systems, robot and automation control systems and offers great conveniences. In particular, the control of power and the adjustment of the amount of power transferred are among the important issues in the electric-electronic world. Learning about this technique by our students will greatly increase the employment opportunities when it is considered the need for qualifications to set up and program Arduino Card, which we see as new and innovative technology.

Exchange of ICT practices: Java robot programming in a European context



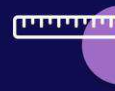
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School Exchange Partnerships	Coord: Luitpold Gymnasium München (Germany)	2019 – 2020
<p>In the project „Exchange of ICT practices: Java robot programming in a European context“ we would like to introduce object-oriented programming to robotics classrooms in Europe. This concept can be applied to Lego EV3 mindstorms robots which are widely distributed in schools in entire Europe and North America. The Fraunhofer Institute in Germany with its robotics initiative „Roberta“ has been promoting object-oriented programming, a de facto programming standard in application and web application programming, since 2014. We would like to have this institute as our partner for a first kick-off meeting in Munich in September 2019 where we would host a teacher workshop to learn about the possibilities of programming the Lego EV3 mindstorms robots with Java (an object-oriented language).</p>		
Innovating New Teaching Techniques for Our Future Schools		
School Exchange Partnerships	Coord: Waldorfschule Hamm (Germany)	2018 – 2020
<p>Our project aim is to help students and moreover the disadvantaged students to overcome barriers of different kind. The specific objectives of the INTERNET project are: to increase learning motivation for the students; to develop teamwork skills for our students and staff; to address on-going relevant professional development in ICT/programming skills using transnational expertise and facilities; to compare and contrast school methods in order to show our students and staff that we live in a different country but we have a common aim; to build character, values of fairness and respect and increase self-esteem of our students; to identify, share and build on examples of best practice in raising attainment; to enhance teaching and learning by demonstrating pro-active teaching methods; to develop language and communication skills; to improve skills in the use of the eTwinning platform to facilitate better communication and collaboration for students and teachers alike; to celebrate achievement not only in our schools but also in the wider local community; to further enhance links with partner schools and institutes across Europe.</p>		
Full STEAM ahead!		
School Exchange Partnerships	Coord: Zespól Szkól Ogólnokształcących (Poland)	2019 – 2021
<p>The project's objectives are: increasing motivation of students, particularly females, to study STEAM subjects; fighting stereotypes regarding female role in STEAM world; raising awareness of STEAM studies as career opportunities; improving knowledge and capacity in STEAM area, implementing more active, hands-on methods while teaching STEAM; making STEAM teaching and learning fun and exciting; strengthening the profile of teachers by exposing them to innovative teaching and motivating methods. We also want to make our students aware of their European cultural heritage through familiarizing them with famous scientists (particularly women), whose discoveries and historical achievements constitute the basis of modern science and development.</p>		
Science, Technology, Engineering, Math (STEM) in European schools		
School Exchange Partnerships	Coord: Scoala Gimnaziala "Theodor Costescu" (Poland)	2018 – 2020
<p>Skills in science, technology, engineering and maths (STEM) are becoming an increasingly important part of basic literacy in today's knowledge economy. To keep Europe growing, we will need one million additional researchers, technologists, and mathematicians in applied science by 2020 (European 2020 Initiative). This quotation from the EUN School net webpage could be the perfect motto for our project. The creativity of the international teams, sharing of own and mutual values, each school's own work in the field of STEM, mutual offline and online meetings together with development of digital content – all of these skills in one project creates a fantastic challenge not only for students but also for teachers. All the project activities, theoretical as well as practical contents will be included in a booklet which will constitute a valuable material to be distributed to schools in the regions and the countries involved via web, hardcopies and direct dissemination sessions. We also intend to promote the project outcomes within our non-school communities, because as it was stated before, sometimes the aggressive attitudes targeting certain</p>		



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groups/categories of people stem from the environment in which students were brought up. Therefore, we hope that students will be teaching adults in their communities a lesson, as a result of this project.

Malí programátori

School Exchange Partnerships

Coord: Zakladna skola Dargovskych hrdinov 19 (Slovakia)

2019 – 2021

The realisation of a project Little Programmers is planned for 2 years. Both students and teachers are going to become familiar with different types of applications and tools Web 2.0, code in Scratch and acquired skills will be used for work with robots. All of the participants will construct and program the programmable LEGO robots and robotic toys – Blue Bot and OZOBOT Bit. They also will acquire algorithm thinking and basic programming principles. Students in international teams will solve challenges via programmable LEGO Boost bricks in special software. Project implementors will inform the other students and teachers with basic concepts of coding and the world of robots, with new approaches of using ICT. Teachers will suggest coding and using robots in different subjects of the 1st level of Primary School. Pupils of the 1st level of Primary School, in age 7-10, will participate in project activities. Pupils from 1st grade to 4th grade will become involved in project, in number 500, from two Schools of Partnership Community. In project team there will be pupils from classic classes, pupils form classes for intellectual talented ones, even the pupils with special needs. We will cooperate with preschoolers and preschooler educators. The aim of our project is to acquire pupils and teachers with basic concepts of coding and programming, application new approaches in ICT learning, to support the practical ideas for integrating programming and robotics into education of the 1st level of Primary School. We are going to form methodology for teachers, digital sources for programming and robotics, to integrate basic

CODING in a cultural Europe

School Exchange Partnerships

Coord: Colegio Publico Ocejon (Spain)

2018 - 2020

The project "Coding in a Cultural Europe" wants to create a network of schools across Europe to develop the "21st Century Skills"; such as creativity and innovation, critical thinking and problem solving, digital competence, teamwork and collaboration in virtual teams, multiple languages and cultural awareness. Our aim is to develop and share good practices and innovative educational ways to use coding and new technologies at school, for students from 3 to 13 years old, in order to create a computational thinking vertical curriculum. Spain, Lithuania, U. Kingdom, Turkey, Croatia and Poland will be partners in this project: they have different backgrounds and they will bring their experience and skills in using coding and computer programming in the daily activities. Therefore, the goal of the project is to learn from each other and experience together new activities and methodologies to develop critical and computational thinking.

MY CODE SIBLING

School Exchange Partnerships

Coord: HACIKAZIMOGLU ILKOKULU (Turkey)

2019 – 2021

Despite all these studies, according to the data obtained from the pre-test results, the rate of application of innovative teaching methods in our school is 40%. We aim to increase this ratio with this project which we prepare with the content of good practices. In this context, in our project, which is composed of 6 partner countries in total, Europe 2020 is among the European basic criteria for promoting creativity and innovation, including entrepreneurship at all stages of education and training, including increasing the quality and efficiency of education and training, and for achieving these objectives. We have decided to work on innovative teaching methods with our stakeholders by taking into consideration the aims of providing 21st century skills to students and increasing the rate of foreign language learning and increasing the participation rate in European school network activities.

Girls coding their own future

School Exchange Partnerships

Coord: Women in Digital Initiatives Luxembourg Asbl (Luxembourg)

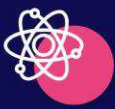
2015 – 2016



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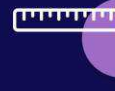
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The goal of this project is to exchange best practices and experience, especially in informal learning context, to encourage girls and young women to learn how to use new technologies, especially in coding and programming, as an enabler to create new opportunities for themselves, the society and the economy.

This seminar is aimed to youth leaders and project managers active in the field of informal education with a strong interest for the topic of gender equality in regard to new technologies and digital education.

GO_PRO! - Regional Programming Centers

Capacity Building for youth

Coord: STOWARZYSZENIE EDUKACJI POZAFORMALNEJ MERITUM (Poland)

2017 – 2018

Within the project GO_PRO! we would like to build the capacity of partner organizations to develop ICT skills and support digital and social inclusion of Youth in local communities. We would like to create space (non-formal education centers) for developing ICT and programming skills. The basic idea is to use the existing infrastructure, only reconfigure it. To create previous GO_PRO! Centers we cooperated with partner organizations – school, libraries, NGOs. Well-equipped educational centers can create great conditions for modern programming education, which especially important in developing countries and/or rural areas. Partners shall organize interesting IT lessons, but also allows (during so called Coder Clubs) youth to develop programming skills during their free time. Coder Clubs are based on challenges. Each week there is a new problem, new challenge, which Club must solve together! Youth need to learn new thing about algorithm, build a robot using Lego Mindstorms, and then program it properly.

HORIZON 2020 PROGRAMME

Go-Lab Initiative

H2020

Coord: University of Twente (The Netherlands)

2017 – 2019

The Go-Lab Initiative arose from the successful Go-Lab project (2012-2016) and gave the initiative its name. The aim of the Go-Lab Initiative is to facilitate the use of innovative learning technologies in STEM education, with a focus on online laboratories (Labs) and inquiry learning applications (Apps). Using the Go-Lab ecosystem, teachers can find various Labs and Apps, and create customized Inquiry Learning Spaces (ILSs). Furthermore, the Go-Lab Initiative conducts training for teachers on the topics of Inquiry-Based Science Education (IBSE), development of 21st-century skills, and the use of ICT and the Go-Lab ecosystem in the classroom. Over the years, several projects contributed to the development of the Go-Lab ecosystem, which consists of the Go-Lab Sharing and Support platform (Golabz) and the Authoring and Learning platform (Graasp). In cooperation with multiple partners, experts, and external online lab providers, the Go-Lab ecosystem has the biggest collection of Labs (virtual labs, remote labs and data sets), a set of pedagogically designed Apps and more than a thousand ILSs created by teachers and experts. The Go-Lab Initiative team has conducted hundreds of training events across Europe and in Africa, reaching out thousands of teachers, educators, and educational institute leaders. The Go-Lab ecosystem is a free platform that can be used by any teacher from any country.

CREATIONS - Developing an Engaging Science Classroom

H2020

Coord: UNIVERSITAT BAYREUTH (Germany)

2015 – 2018

The CREATIONS coordination action aims to demonstrate innovative approaches and activities that involve teachers and students in Scientific Research through creative ways that are based on Art and focus on the development of effective links and synergies between schools and research infrastructures in order to spark young people’s interest in science and in following scientific careers. It aims to support policy development by a) demonstrating effective community building between researchers, teachers and students and empowering the latter to use, share and exploit in an innovative the collective power of unique scientific resources (research facilities, scientific instruments, advanced ICT tools, simulation and visualisation applications and scientific databases) in meaningful educational activities that build on the strengths of formal (educational field trips, virtual visits, school based masterclasses) and informal (games and student generated apps, webfests and hangouts, related artworks like science theatre or student generated exhibits, debates in the framework of junior science cafes) learning, that promote creative inquiry-based



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learning and appreciation of how science works, b) demonstrating effective integration of science education with infrastructures through monitored-for-impact innovative activities, which will provide feedback for the take-up of such interventions at large scale in Europe and c) documenting the whole process through the development of a roadmap that will include guidelines for the design and implementation of innovative educational and outreach activities that could act as a reference to be adapted for stakeholders in both scientific research outreach and science education policy.

Partnerships for pathways to Higher Education and science engagement in Regional Clusters of Open Schooling

H2020	Coord: KINDERBURO UNIVERSITAT WIEN GMBH (Austria)	2019 – 2022
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Children’s Universities (CUs) encourage youth to try new experiences and develop new interests. They represent a trend in modern societies. Many academic institutions adopt them as part of the Third Mission (to engage with societies) in universities. The aim is to spread knowledge outside the academic environment with considerable profit for the society and the economy. The PHERECLOS project intends to bring together schools and academic actors to develop collaborative educational environments. It will create six Local Education Clusters (LECs), which will work as agents of innovation in education and play a fundamental role in advancing critical thought, decision-making, competitiveness and sustainable development among children and youth.

Learning science the fun and creative way: coding, making, and play as vehicles for informal science learning in the 21st century

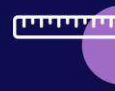
H2020	Coord: NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU (Norway)	2018 - 2021
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The CoM’n’Play-Science project aims to help Europe better understand the new ways in which informal science learning is taking place through various coding, making, and play activities that young Europeans are nowadays increasingly engaged with outside school and higher education science classrooms, beyond the formal boundaries of science education. The project investigates a wide range of loci and modes of this kind of informal science learning, including: a) learning occurring in the context of such activities intentionally organized to achieve informal science learning; b) informal science learning that occurs as a by-product of youngsters’ various coding, making, and play activities that are not intentionally meant for science learning, and which may take place either in organized contexts or independently in everyday life. Carefully positioning the research within the context of the overarching contemporary discourses on STEM/STEAM education, RRI, and science capital, the proposed project aims to shed light on the nature and impact of the informal science learning gained through coding, making and play activities. It identifies diverse practices and looks deeper into a sample of them, whereby participants of real-life activities are surveyed, observed, and gamefully engaged in intensive research. The project further explores the impact of this kind of informal science learning on: a) formal science education and more traditional informal science learning interventions; and b) scientific citizenship, investigating in particular the attitudes, values and dispositions that young people as learners and as citizens may develop through such activities towards science, scientists, and science-related information in everyday life. The project enables the exploitation of its research findings by developing relevant guidance for practitioners and recommendations for policy making and further research, and through an overall extrovert project approach.

SYSTEM 2020: Connecting Science Learning Outside The Classroom

H2020	Coord: THE PROVOST, FELLOWS, FOUNDATION SCHOLARS & THE OTHER MEMBERS OF BOARD OF THE COLLEGE OF THE HOLY & UNDIVIDED TRINITY OF QUEEN ELIZABETH NEAR DUBLIN (Ireland)	2018 - 2021
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SySTEM 2020 will focus on science learning outside the classroom, mapping the field across Europe, evaluating a number of transdisciplinary programmes to design best principles for educators in this field, and also examining individual learning ecologies by piloting self-evaluation tools for learners which will document science learning outside of the classroom. This study will map practices in 19 EU countries, including in-depth studies in 8 of these countries, covering learners between 9 - 20 years from various backgrounds including those from geographically remote, socio-economically disadvantaged, minority and/or migrant communities.

**S****T****E****A****M****Interactive Music Science Collaborative Activities**

H2020

Coord: ATHINA-EREVNITIKO KENTRO KAINOTOMIAS STIS TECHNOLOGIES TIS PLIROFORIAS, TON EPIKOINONION KAI TIS GNOSIS (Greece)**2017 – 2019**

SYSTEM 2020 will focus on science learning outside the classroom, mapping the field across Europe, evaluating a number of transdisciplinary programmes to design best principles for educators in this field, and also examining individual learning ecologies by piloting self-evaluation tools for learners which will document science learning outside of the classroom. This study will map practices in 19 EU countries, including in-depth studies in 8 of these countries, covering learners between 9 - 20 years from various backgrounds including those from geographically remote, socio-economically disadvantaged, minority and/or migrant communities.

Center for STEAM Education Research, Science Communication and Innovation

H2020

Coord: UNIVERSITY OF CYPRUS (Cyprus)**2017 – 2018**

Establish in Cyprus a Science and Research Center to:

- Undertake competitive interdisciplinary research of excellence for the development of innovative tools and exhibits for Science, Technology, Engineering, Art and Mathematics (STEAM) Education and Science Communication.
- Promote science literacy and capacity building through informal STEAM Education using interactive Science Technology and Engineering (STE) exhibits, demonstrations and contact with scientists.
- Contribute towards a Responsible Research and Innovation (RRI) culture through open schooling, Science Communication and outreach activities.
- Provide teacher professional training for integrating in-house developed ICT tools in formal STEAM Education and promote endorsement of new STEAM educational strategies and curricula
- Serve as a hub to communicate and disseminate to public and industry innovative technology research outcomes and evidence-based practice to policy makers and provide a platform for entrepreneurship for supporting public engagement in entrepreneurship and start-up companies.

Digital Fabrication and Maker Movement in Education: Making Computer-supported Artefacts from Scratch

H2020

Coord: ITA-SUOMEN YLIOPISTO (Finland)**2017 – 2018**

The eCraft2Learn project will research, design, pilot and validate an ecosystem based on digital fabrication and making technologies for creating computer-supported artefacts. The project aims at reinforcing personalised learning and teaching in science, technology, engineering, arts and math (STEAM) education and to assist the development of 21st century skills that promote inclusion and employability for youth in the EU. The eCraft2Learn ecosystem will support both formal and informal learning by providing the appropriate digital fabrication, making technologies, and programming tools. It will also incorporate mechanisms for personalised and adaptive learning.

STEAM- Making Sense of Science through Art

H2020

Coord: UNIVERSITY OF HUDDERSFIELD (Finland)**2016 – 2017**

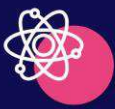
STEAM will adopt a novel multidisciplinary approach which utilises the medium of art and creative disciplines to communicate complex STEM concepts to a wide audience. The University of Huddersfield will be the primary site for the STEAM events which will showcase the research ongoing at universities and businesses across the Yorkshire Region, emphasizing specifically the pan-European research with which we are involved. STEAM will create a platform for public interaction through an exciting array of events, fun activities and presentations, where researchers from numerous and diverse disciplines will engage directly. The aim will be to engage with the general public, to illustrate to them the diversity, importance, and impact that this research has on everyday lives, and specifically young people to familiarize them with researchers in person to demystify any misconceptions they may hold and provide strong career role models. Two events are proposed (2016 and 2017) with the STEAM theme running across the two years, developments in research in 2017 will be emphasized to reflect the rapidly evolving nature of science.



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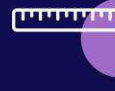
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Open Science Hub Network: Empowering Citizens through STEAM Education with Open Schooling

H2020

Coord: UNIVERSITEIT LEIDEN (Netherlands)

2019 – 2022

The Open Science Hub (OSHub) project will work with schools to bring science, technology, engineering, art and mathematics (STEAM) education to the communities, as a tool for their sustainable development. Their aim is to inspire, empower and engage citizens – from school children to senior citizens. It will engage schools in tackling challenges faced by their local communities through collaborations among local enterprises, local schools’ researchers, and social innovators. By forming a network, OSHub will help schools become actively involved as agents for collaboration between civil society, enterprises, research institutes and community. Each OSHub in the network will be co-led by local schools so students, teachers and principals can participate in the development and implementation of activities.



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Creating a training of teachers programme dedicated to computational thinking



1. Develop the programming skills of teachers to benefit fully from the advantages of digital solutions in the classroom
2. Enhance interdisciplinarity and creativity in the learning process by developing computational thinking approach for teachers
3. Provide best practices and examples of innovative pedagogies in teaching STEAM at secondary schools

