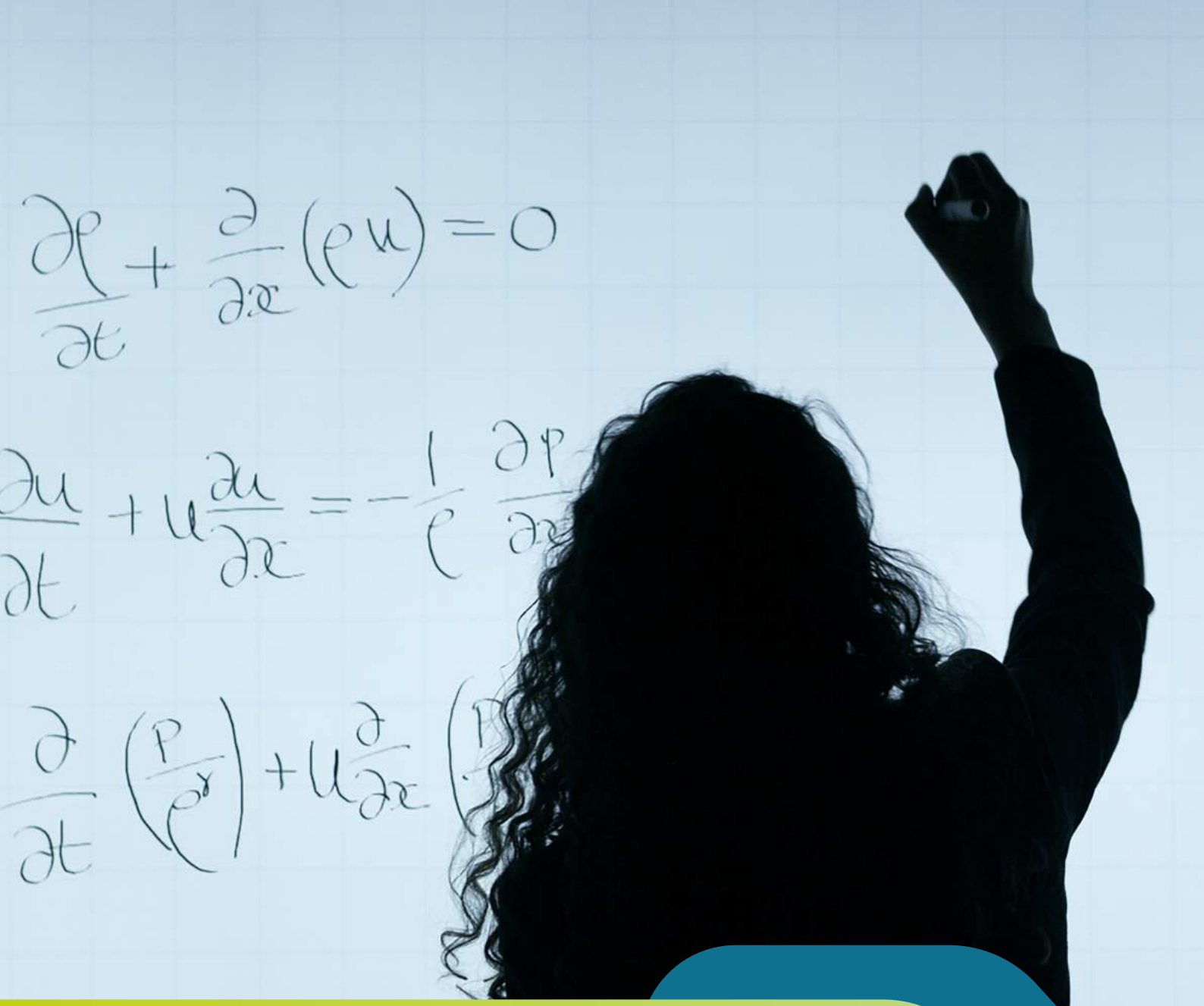

State of the art analysis of existing initiatives, best practices and attitudes towards STE(A)M in educational contexts

D2.4 Reflective Practice Case-study Compendium

CHOICE

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CHOICE

Increasing Young People's Motivation to Choose STEM Careers Through an Innovative Cross-Disciplinary STE(A)M Approach to Education

WP2 - State of the art analysis of existing initiatives,

best practices and attitudes towards

STE(A)M in educational contexts

D2.4 Reflective Practice Case-study Compendium

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EUROTraining

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Contents

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Introduction

The following Compendium of best-practices was designed by the work package leader EUROTraining – Greece under the guidance of the project coordinator CESIE – Italy, with support from project partner Lifelong Learning Platform – Belgium. It was developed with the contributions of all the core project partners including GrantXpert – Cyprus; and Blue Room Innovation – Spain.

This document is a collection of case-studies discussed during the reflective groups by the three key stakeholder groups: representatives from businesses, HEI and local authorities, conducted in all implementing partner countries. It functions as an add-on to the ***State-of-the-Art Study***. The compendium describes:

- measures and practices adopted or proposed by the selected businesses and academic institutions to increase motivation among young people, especially women, to undertake STEM careers,
- success stories related to cross-sectoral cooperation with the involvement of businesses, HEIs, policy-makers and school systems,
- existing measures and case-studies demonstrating successful modes to increase young people's interest in STEM subjects, especially those related to practical use of STEM knowledge to address real-life problems,
- measures adopted by the involved companies, HEIs and local authorities to open access for both female and male students to their field of action to address gender segregation in the STEM field

The compendium collects the results of an in-depth reflection on existing measures, best practices and needs from the academic and business world, as well as on the policy level, thus providing a lever to align the new action proposed by CHOICE to existing initiatives.

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Methodology

All core partners implemented one or two reflective groups involving overall 6 people per country. The results were initially included in the national *Reflective Group National reports*. The national reports were developed under the guidelines and templates provided by EUROTraining, under the guidance of CESIE and they were finalized after the review of all project partners. The template that was followed can be found in Annex I.

The reflective groups aimed to identify a set of issues at university, labour-market and policy level demonstrating the necessity of adopting a STE(A)M approach to STEM education since school, and positive measures adopted as well as initiatives and policies in place within their working context promoting STEM education (with a STE(A)M approach).

The procedure was based on non-formal and participatory approaches, e.g. reflective practice techniques able to boost reflection on specific issues and activate a learning process, group discussions to undertake deeper reflection, sharing reflections with others, consider further improvements.

The participants for each project partner implementing the reflective groups were:

- **2 managers from companies in the STEM field**
  Representatives from companies in the STEM field, who will provide inputs about needs, issues and approaches of STEM in real-world applications. Role models from the business world, who have chosen a STEM career and can provide first-hand testimony of real-life-applications.
- **2 representatives from Higher Education Institutions (HEIs)**
  Professors, PhD, etc. from the STEM field, who will provide inputs about needs, issues and approaches of STEM in real-world applications. Role models from academia, who have chosen a STEM career and can provide first-hand testimony of real-life-applications.
- **2 representatives from local authorities**
  Government Ministries, Administrative bodies, departments, National Chambers of Commerce and Industry, etc.

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Collection of Case-studies

Italy

POLIWO Project

The main aim of the project is to increase the access to female students in the engineering faculties, due to the low percentage of female students registered in these faculties, compared to male students. The project has an important focus on gender issues: the *We are HERe*" awareness raising campaign was organized to dispel gender stereotypes by telling the experiences of female students and researchers.

- **Type of initiative:** project and awareness raising campaign
- **Organization of the initiative:** Polytechnic University of Turin
- **Type of organization:** the project was coordinated by Higher Education Institutions
- **Funded by:** Polytechnic University of Turin
- **Lessons learnt:** many female students who participated in the project said that they were more confident, that they had overcome their limits and gave their contribution to fight gender stereotypes within the university environment.
- **History, Goals and Key Aspects:** The project was launched with the goals of fighting gender stereotypes in the engineering world through events, news and stories of the women who made science and, above all, the women who will make it. "*We are HERe*" is the interactive campaign with which the Polytechnic of Turin has decided to put itself at stake on Equal Opportunities and on the inclusion of female figures in STEM (Science, Technology, Engineering and Mathematics). Girls interested in science need points of reference, and one of the fundamental problems for young future engineers is the absence of concrete and achievable models that can fulfil their imagined expectations: the goal of the project is to create this model as well as points of reference for young female students.

Art, Origami and Mathematics Project (*Progetto Arte, Origami e Matematica*)

The project involved students from 5 to 17 years old and aims at promoting STEAM approaches in education of mathematics, with the inclusion of art. Students have to choose a paining during the lesson, and for each painting, 3 or 4 elements are covered with origami models. Each origami model is combined with a specific math lesson: topics are suitable for the class (from primary school to high school). For high school students, each model has technological application.

- **Type of initiative:** Project

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- **Organization of the initiative:** Polytechnic University of Turin
- **Type of organization:** The project was coordinated by Higher Education Institutions
- **Funded by:** The project was partly funded by the school (materials) and partly by my own research funds (travel).
- **Lessons learnt:** mathematical logic, problem solving with trigonometry, continuous and derivable, integral functions
- **History, Goals and Key Aspects:** The goal of this initiative is to integrate art in the teaching of STEM disciplines. Playing with origami means exploring shapes and structures and it is the best introduction to the geometry of space. It also stimulates intuition and creativity, so it is definitely mathematics. The technique of folding paper (from Japanese “origami”) is used in this way to explain and visualize algebraic concepts such as exponentiation and their sums or standard identities. This tool is therefore suitable for inclusive and innovative didactics that takes up the concepts of "learning by doing" and "visual learning".

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Greece

STEM STARS Greece

The STEM STARS GREECE Competition was organized for the first time this year in Greece, in order to support, highlight and reward female students aged 14-18, with a special inclination and talent in science, technology, engineering or mathematics (STEM).

- **Type of initiative:** Competition
- **Organization of the initiative:** NGO SciCo, with the support of the US Embassy in Athens, and the Ministry of Education and Religious Affairs
- **Type of organization:** SciCo[1] is a Non-Profit Organisation whose aim is to communicate scientific issues to the public via innovative and entertaining means. SciCo was founded in 2008 and it consist of scientists, academics, educators, artists and people with an interest in everyday science. SciCo operates as a social enterprise.
- **Funded by:** Ministry of Education and Religious Affairs, and the US Embassy of Athens.
- **Lessons learnt:** The participation rates of the contest show that children have a strong inclination in STEM especially when they involve gamification and contests.
- **History, Goals and Key Aspects:** The goals of the initiative are for children to delve into a STEM Scientific field of their, to improve their research, collaboration, presentation and communication skills, to gain confidence in presenting their findings to the public, to be part of a network with people with similar research interests, scientists and STEM professionals.

@POSTASIS

The @postasis project targets real-time artistic education through the development of a suitable platform that enables: the setup of real-time courses within the virtual and physical space, accessible by different participants at the same time (multiuser), the collaborative creation of artistic projects, both in the virtual and in the physical space (e.g. a virtual artistic exhibition, an Internet-of-Things installation), by different participants, the support of large-scale geographically dispersed events and actions brining the above experiences to interested stakeholders and the public (e.g. artistic happenings, transnational projects and seminars, interdisciplinary scientific experimentations). d. the archiving of acquired experiences to new forms of educational material (e.g. e-books).

- **Type of initiative:** Platform
- **Organization of the initiative:** Athens School of Fine Arts, Paris-8 University, Ωmega Technology, Argenia, MAD Emergent Art Center (MAD)

[1] Science-Communication. 2020. *Scico*. http://scico.gr/en/about-us/.

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- **Type of organization:** The project was coordinated by Higher Education Institutions
- **Funded by:** the EU and the State Scholarships Foundation
- **Lessons learnt:** This case study involves a European project which involved methods of gamification, e-learning, design thinking, project-based learning and the use of technologies in higher education.
- **History, Goals and Key Aspects:** The goal of this initiative is for state-of-the art technologies to be better incorporated in contemporary education using platforms for distant education, open courses, virtual realities, and MOOCs. The project started as an initiative among higher education institutions due to the fact that the area that has not been thoroughly exhaustively investigated, regarding artistic education, is that of a real-time education that enables multi-user experiments, the archiving of common experience towards the production of new knowledge, and the support of physically distributed actions in virtual space (like seminars and workshops).

Examples of policies and initiatives that promote the STE(A)M approach are:

- The CanSat national contest organized by Spin – Space Innovation supported by the ESA and the National Technical University of Athens
- Also, a workshop aiming to help people with special needs come into contact with miniature machines of the museum of Tsalapata, the Technology and Industry museum of Volos supported with the Cultural Foundation of the Piraeus Bank Group
- Vodafone Generation Next, is a STEM-skills development training program for children about new technologies and science with free access for all. The Vodafone Foundation brings a new educational experience and empowers the "explorers of today" to build the society of tomorrow that they dream of.

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Cyprus

ENGINITE

ENGINITE was an Erasmus+ KA2 project that aimed to design, develop and pilot a postgraduate Vocational Education and Training (VET) programme combining advanced applied academic topics with hands-on aspects in order to endorse the knowledge and employability skills of graduate engineers and prepare them for the industry of the 21st century. Upon completion of their training, engineers were placed in companies for hands-on experience in the industry.

- **Type of initiative:** Post-graduate program
- **Organisation of the initiative:** Cyprus University of Technology (Project Coordinator) in collaboration with Aalborg Universitet, Technical University of Crete, CUBEIE L.L.C., GrantXpert Consulting Limited and Useful Simple Projects Limited (Think Up).
- **Type of organisation:** Public Higher Education Institution
- **Funded by:** EU (Erasmus+ KA2 action)
- **Lessons learnt:** The skills acquired through the project's training programme were exactly what graduate engineers needed the most during their internships for their work and what their employers required.
- **History, Goals and Key Aspects:** The goal of this project was to design and promote a postgraduate Vocational Education and Training (VET) programme based on a PBL pedagogy combining advanced applied academic topics with hands-on aspects, in order to endorse the knowledge and skills of graduate engineers. The ENGINITE programme captivates the employability skills of engineering graduates, as well as innovation, entrepreneurial skills, health and safety management, problem solving, communication and presentation skills, while it also enhances technical knowledge in critical fields of engineering. Upon the completion of the training, participants were able to work in companies for three months and apply their newly acquired skills. Ultimately, the programme helps preparing engineering graduates for the industry of the 21st century, enables them to lead multidisciplinary teams, and provides added-value and substantial contribution to their organisation.

Youth Makerspace Larnaca

The Youth Makerspace provides young people with access to high-quality and state-of-the-art equipment, such as 3D printers, virtual reality and robotics, fostering horizontal and transferable skills, use of new technologies, enhancement of creativity, innovation and entrepreneurial mindset.

- **Type of initiative:** Access to equipment
- **Organisation of the initiative:** Cyprus Youth Board in collaboration with Larnaca municipality

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- **Type of organisation:** Public Higher Education Institution
- **Funded by:** Cyprus Youth Board & Larnaca municipality
- **Lessons learnt:** During its 2-year-long operation over 2000 young people have participated in workshops, seminars, lectures and other activities reinforcing the development of horizontal and transferable skills.
- **History, Goals and Key Aspects:** Youth Makerspaces represent the democratisation of design, mechanisation, construction and education following the Makerspace standards developed by Higher Education Institutes and other communities abroad. These spaces are hubs for hands-on, project-based learning, creation and invention supporting the integration of Art in STEM subjects. The Makerspace in Larnaca hosts workshops, seminars, lectures and other activities for schools, student groups and families. A lot of students visited the makerspace again following their first visit with their school. Their plan is to reach out to more schools by creating a mobile Makerspace that will visit primary and secondary schools across all regions.

Examples of initiatives that promote the STE(A)M approach include:

- The EU Robotics Week in Cyprus since 2013, which is organised by one of the company representatives in collaboration with local authority representatives. Students' interest in participating increases exponentially every year. In addition, students become more motivated to study Robotics and Informatics. To date, thousands of students have participated in the EU Robotics Week and hundreds of teachers have attended Robotics seminars, highlighting that there is definitely a huge interest in this field by both students and teachers.
- "Coding our future" is another successful initiative in Cyprus that began in 2016 by the Cyprus Computer Society and Mathisis to provide the opportunity to students, parents and teachers to become familiar with programming. More than 10,000 individuals have already participated in the programme's events, seminars and workshops that are offered for free with sponsorships from various organisations.
- The European Space Agency is also organising training workshops for primary and secondary teachers to explore best practices and innovative uses of astronomy and space sciences for education.
- The Cyprus Pedagogical Institute is also currently participating in a European programme focusing on the design of STEM subjects for primary and secondary schools. It entails a long-term project that demands lots of on-site visits at schools for reforming the existing curriculum in order to introduce the STE(A)M approach.

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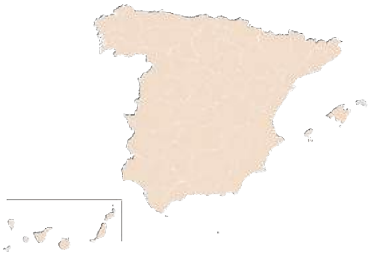
Spain

EdTechSTEAM

The main aim of the project is to eradicate gender gap in technological entrepreneurship.



- **Type of initiative:** project and awareness raising campaign
- **Organization of the initiative:** Technovation Spain
- **Type of organization:** the project was coordinated by private organization
- **Who funds the initiative:** companies as Cisco, Microsoft etc.
- **Lessons learnt:** The program started about 10 years ago, it is aimed only at girls (1000 participants so far), trying to overcome a little the reluctance that girls have at an age in which we consider that it is key that they be interested in these issues, which is the age of the institute. It is a completely free program and it is also carried out entirely by volunteers.
- **History, Goals and Key Aspects:** The project was launched with the goals of fighting gender stereotypes in the technological entrepreneurship. Technovation Spain is a network made up of eleven ambassadors who coordinate the program from Madrid, Catalonia, the Valencian Community, Aragon, Murcia and the Canary Islands. Its mission is to locate girls' teams to participate in an international contest that rewards the best applications to solve social problems related to education, poverty, equality, peace, health and the environment. The Technovation award are funds to finish developing the applications or for an educational purpose such as the purchase of school supplies or the financing of courses. The goal to discover for the girls some of the skills and abilities typical of STEM disciplines. It seems that the program is working according to its organizers, after participating in Technovation, 70% of girls around the world are interested in starting studies related to technology.

Girobotica

Girobòtica is a project promoted by the Josep Pallach Institute of Education Sciences and the Higher Polytechnic School of the University of Girona, aimed at primary students in schools in the Girona region, which aims to encourage learning from the resolution of a challenge, closely linked to the current moment and immediate environment.

- **Type of initiative:** Educational Project
- **Organization of the initiative:** University of Girona
- **Type of organization:** The project was coordinated by Higher Education Institutions

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- **Who funds the initiative:** The project was partly funded by university (materials) and partly by IT companies.
- **Lessons learnt:** teamwork, innovation, creativity and entrepreneurship among children
- **History, Goals and Key Aspects:** The project fosters teamwork, innovation, creativity and entrepreneurship among children and children from 6 to 12 years old, as well as curiosity and interest in science and technology. It is based on a pedagogical and methodological innovation model called STEAM (Science, Technology, Art & Engineering) that wants to give children the opportunity to identify real problems to find creative and personal solutions, accompanying and leading their own learning process and developing a critical spirit and commitment to society. Teachers need more support to implement activities related to creativity, critical spirit, innovation, curiosity, etc. in this sense we have created Girobòtica together with the University of Girona aimed at primary school students and started a structure similar to that of competitions.

Inventors4Change

It is an International project, which promotes ChangeMakers education for the 21st century among children from vulnerable groups in India, Colombia and Spain, by involving them through Technologies for creative learning, education for global citizenship and collaborative digital storytelling.

- **Type of initiative:** Project
- **Organization of the initiative:** University of Girona
- **Type of organization:** The project was coordinated by Higher Education Institutions
- **Who funds the initiative:** The project was partly funded by university (materials) and partly by IT companies.
- **Lessons learnt:** teamwork, innovation, creativity and entrepreneurship among children.
- **History, Goals and Key Aspects:** At UdiGitalEdu there are projects to deal with the gender gap in technology and engineering and historically they have focused more during the last decade on the socio-economic gap in Catalonia. The work focuses a lot in primary schools of high complexity which means schools with a lot of immigration which generates some internal dynamics. Every year the "Inventors4Change" challenge is launched which links to one of the goals of the sustainable development of the United Nations and for a few months because the children research on that topic, for example, climate change, refugees and share opinions and learn to use their own voice, learn digital skills and end up programming through Scratch software and creating a collaborative project on what they have researched. It is an example of how to connect with children, connected education and education with values and also that in a transversal way they are developing a lot of digital skills.

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Findings

All participants agreed that STEM is not just an educational approach, but the 'key' in reinforcing soft skills of students, including innovation, critical thinking, problem solving skills, communication and presentation skills. Participants also noted that it is more difficult to acquire or reinforce such skills in adulthood, highlighting the **need to foster these skills from an early age**, starting from primary school. Together with humanities, STEM is also linked with computational thinking, which does not only involve computers, but also examples of how music and grammar are involved with computational thinking. Over the years, students have been taught computer science, informatics, mathematics, but they were not necessarily introduced to computational thinking. The term "creative industries" has been recently introduced to describe businesses that involve creativity, like design, music, publishing, film and video, crafts and computer games. Creativity is a new phenomenon in economics but it has been gaining ground the past few years.

Positive measures that promote STEM education with a STE(A)M approach include **workshops and seminars** organised by public authorities for primary and secondary school teachers focusing on innovative approaches, robotics and ICT-based tools in STEM education.

Issues at university, labour-market and policy level demonstrating the necessity of adopting a STE(A)M approach to STEM education since school

However, such training is often organised **outside working hours**, making it impractical for some teachers to attend. Additionally, although most teachers are motivated to learn new approaches and to learn how to use innovative educational tools, **no funding** is available to equip public schools with Robotics or ICT-based tools for educational purposes. Finally, further training rarely contributes to the teachers' professional development and/or promotion in public schools. As a result, **teachers working in private schools** are more likely to attend training courses until completion. Therefore, there is a need for additional motives to be set by the Ministry of Education in order to motivate teachers to pursue further training and learn new educational approaches in STEM education. The teachers need more support to implement these types of activities where creativity, critical spirit, innovation, curiosity, etc. must be implemented as they should be given more support.

An important input from the focus groups was that there is a **lack of a common framework** to assess and evaluate STEM skills. A common framework and structured curriculum to use for STEM education at a global level would enable monitoring and evaluating the impact of STEAM education on outcomes and students'

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skills, such as ability to communicate and critical thinking skills, as well as continuous improvement. For this a structured curriculum with measurable outcomes that can work for all initiatives in STEM education at a global level can be developed. Current efforts are being made by different initiatives to categorise skills by age, but **no consensus** has been reached among these initiatives yet.

The real challenges that prevent the introduction of STE(A)M approaches in STEM education comprise: a) the **existing curriculum** that includes separate subjects of STEM instead of one that follows an integrative subjects approach; b) the lack of innovative and high-quality **educational material** that reinforces students' interest towards STEM; and c) the **scarcity** of Vocational Training and professional development of teachers in STE(A)M approaches and ICT tools for educational purposes.

Measures and practices adopted or proposed by the selected businesses and academic institutions to increase motivation among young people

There are many countries that involve support policies for creative industries and these begin with education. In both formal education and lifelong education there are measures that can be adopted to support creative industries, for example: In formal education on a national level, universities can build flexible curriculums for creative industries and support their cooperation between them and private companies, especially in interdisciplinary programs. On regional and local level, **creativity and entrepreneurship** can be promoted at school along with ICT education support. In lifelong education, programs of **requalification** in the field of creative industries and support of talented individuals, along with organizing competitions for individuals in creative industries and courses/training programs are measures that can be implemented in development strategies. Each measure has its own drawbacks and strengths, so the local environment must be studied in order to properly design adequate support policies.

Regarding the issues on school level that impede the promotion of creativity in STEM subjects, the participants agreed that the schools could introduce **actions** that will be based on the **cooperation of educators** of various disciplines.

Measures to include both male and female students to the field of action of STEM were discussed as well. STEM company representatives made the point that the familiarization of children with the concept of scientific methods from an early age are a necessity, for example the introduction of algorithmic thought has entered primary schools with emphasis on problem solving and critical thinking, robotic and experimental methods that cultivate logic. A point made regarding the inclusion of women in STEM careers, was the

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inclusion of **more female scientists as role models** in the school material during the school years. A HEI rep pointed out that the male to female ratio in his field at the university is roughly 10:1. However he stated that some women are culturally shaped to be a lot more talented in certain crafts such as jewellery and they have great precision in their movements. For example, if there are dedicated courses to discover one's inclination, people who are not entirely sure about their talents will understand that they have such an inclination.

Additionally, it was supported by the reflective group that the STE(A)M approach greatly increases the interest of girls because it makes sciences more attractive and gives another meaning/interpretation to science. A **lack of knowledge** on the level of the educators was also pointed out, as teachers may lack knowledge in the field of arts. Therefore, a **strengthening of skills** of educators regarding STE(A)M is needed. A great example is the teaching of graphic design for both teachers and students, which is considered the basis, the very **beginning of all visual arts**, starting from the concept of proportion/perspective to shading. It is also greatly connected with our everyday lives in many situations.

The discussion concluded with the participants agreeing that the problem that concerns the STEM enthusiasts does not only involve the students, but also the teachers. The project CHOICE is aimed at the teachers and the message that they want to send to the kids about following a STEM career. The teacher must love the STEM subjects first, even if they are not directly involved in the teaching procedure of these subjects. There is the need for more **intense involvement** of both the professors and the university students. One of the HEI representatives noted that there are students at the university who are quite proficient in STEM studies and very talented, but do not necessarily love science. Another HEI representative noted that the love for STEM subjects starts from a young age, so instead of buying a young girl a conventionally girly toy, we could **consider buying her a toy robot** instead. Moreover, it was highlighted that less developed countries and immigrant students show more openness for the complexity of the STEAM education compared to developed countries where children have all facilities and it is hard to find the motivation to study careers which require a higher effort. They propose to educate children differently from a young age, for example help them to think and enjoy what they are doing. Because if there is not a challenge of something that excites or motivates them, they will hardly choose these areas.

Conclusion

In conclusion, all participants agreed that although there are multiple individual initiatives, **a joint effort is required** by all stakeholders, including local authorities, policymakers, companies and academia, in order to

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be able to reform STEM education at school and introduce innovative STE(A)M approaches into existing curricula. There is also a need for a European and a national platform that will include all of the initiatives, projects and programmes focusing on STE(A)M approaches in order to collect the educational material following a STE(A)M approach that was developed through these initiatives in one central place. This would greatly facilitate the reconstruction of STEM education. Even though there have been lots of initiatives that promote STE(A)M approaches, the majority are promoting a positive culture among students, teachers and parents towards STE(A)M, but do not seem to contribute to the **reform of the STEM** curriculum at schools. This need is in line with the goals of the project CHOICE that aims to be instrumental in promoting policies that support STEM education (with a STE(A)M approach) and in reforming the school curriculum.

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Annexes

Annex 1

Reflective Group Meeting Report Template – provided by EUROTraining

PLEASE NOTE: *Each partner who hosts a reflective group meeting should compile ONE relevant report for EACH focus group based on this template, so* ***each partner will produce two reports in total****. In this way, the partnership will be able to utilize the results of all reflective group meetings, thus improving the quality of the Project's outputs. However, due to the COVID-19 restrictions, partners can hold ONE single meeting, including all foreseen participants (6 in total) and, therefore, provide one overall report.*

Country: _____
Date: ___ / _____ / _____
Time: _____
Duration: _____
Location: _____

1. Methodology

In this section you can describe the methodology you used to conduct the reflective group section, including the following information.

Information on how you recruited your participants; what is the structure of the meeting; duration of the session; name and short profile of the facilitators; highlight here challenges and difficulties regarding in the organization of the meetings.

2. Profile of participants

In this section please provide a brief overview of the participants in the reflective group, including a short summary for each one. Ask for permission to use their photographs.

For example:

- (*Imaginary profile*) participant from HEIs: ***Dr. Chiara Venturella****, phD in Applied Mathematics. Dr. Venturella has been working in the University of Alicante for 5 years, she has experience in …, we chose her because of her deep knowledge in academics, etc.*
- (*imaginary profile*) participant from company in the STEM field: ***Nayia Nicolaou****, CEO in the company 'ACES' AEROSPACE ENGINEERING. Mrs Nicolaou has been the CEO for the company for 6 years and*

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she specializes in…, we chose her because of her vast knowledge in business regarding STEM topics, etc.

- *(imaginary profile) Estel Guillaumes, member of the Chamber of Commerce and Industry. Mrs Guillaumes is the best candidate to speak about the issues in the field, etc.*

3. Synopsis of case study

➢ **-NAME OF INITIATIVE 1-**[2]

Write here a short description of the initiative (3-4 lines)

4. Case Study Overview

➢ **Type of initiative:** (write here: MOOC or Project or whatever it is)

➢ **Organization of the initiative:** (write here for example: the university of Athens, or whatever it is)

➢ **Type of organization:** (write here for example Public institution and NGO, or Private School or whatever it is)

➢ **Who funds the initiative:** (write here for example: the government, or the EU, or the QRF Foundation)

➢ **Lessons learnt:** (write here about the transferability perspective, why do you consider this case study successful, why is it interesting and useful to our project)

5. History, Goals and Key Aspects of the Initiative

(write here the **goals** of the initiative, the **objectives**, the aims and **how it started**)

6. Comments and findings from the Focus Group

Please summarise the main points of the discussion based on the following questions:

General questions for the participants

1. *What is your knowledge about STE(A)M approach to STEM education?*
2. *How did you decide, to become a teacher/etc? What were the courses that motivated you to do it? (for teachers)*
3. *Do you think that your position reflects your skills with regards to STEM courses, such as Engineering together with Arts and Mathematics?*
4. *Do you find it easy to teach students STEM courses? (for teachers)*
5. *What do you think are the **issues** at university level that show us there is a necessity for a STE(A)M approach since school?*
6. *What are the issues at labour-market level that show us that necessity?*

[2] Do not forget to add a reference in the title of the case study 😊

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7. *What are the issues at policy level that show us that necessity?*
8. *What are the positive measures adopted in your working context that promote STEM education with a STE(A)M approach?*
9. *What are the initiatives in your working context that promote that?*
10. *What are already existent measures and policies that promote that?*

Case Study Questions

1. *Which was the challenge and the causes in the case study?*
2. *What means were used to increase young people's interest in STEM subjects?*
3. *What means were used by the persons involved?*
4. *Which were the results of the actions taken to increase interest in STEM? How were they identified/measured?*

7. Conclusions

In this section please provide a synopsis to highlight the key points of the reflective groups and the conclusions.

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