



LEARNING PRODUCTS – RESULTS OF IMPLEMENTATIONS

LEARNING SCENARIOS – INTEGRATED STEM TEACHING IN ONLINE SETTINGS

REAL-WORLD CHALLENGES – COLLABORATION WITH INDUSTRY

STEM CAREERS – SKILLS

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STE(A)M IT 3RD CO-CREATION WORKSHOP SUMMARY

On Friday 25 June 2021, the STE(A)M IT project organized its 3rd co-creation workshop, in collaboration with Scientix, as part of its Ministries of Education STEM representative Working Group meetings programme, aiming to have a look at the first draft of **European Integrated STE(A)M Framework** and to collect feedback from relevant stakeholders that will help to address the possible gaps, overlaps and areas to expand on within the Framework.

The workshop has received more than **50 attendants in total**, including the representatives from **2 companies** (Texas Instruments Education Technology GmbH and Amgen Foundation), **15 Ministries of Education** (from Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Israel, Italy, Luxembourg, Malta, Poland, Portugal, Romania, Spain and Turkey), **13 teachers**, **2 researchers** and **1 teacher training institute representative**. All participants engaged in conversations on the best ways for bringing STE(A)M into European classrooms, sharing with their expertise based on sound experience in STE(A)M education area. Finally, good practices of integrated STEM teaching were introduced by representatives of **3 guest projects** – **STEMonEdu**, **CHOICE** and **In2STEAM** serving as a source of inspiration for further Framework development.



Evita Tasiopoulou, Project and Pedagogical Manager at European Schoolnet, kicked off the workshop by presenting the roadmap to the integrated STE(A)M Framework which included the following steps: **State of Play** (overview of the existing scientific and grey literature research on the topic); **Co-creation workshops**; **Class implementations** (implementations of exemplary learning scenarios created by 11 pilot teachers) **and Focus groups** (group discussions organised with pilot teachers after the implementation of their learning scenarios with their pupils). The findings of these actions laid foundation for the first draft of **evidence-based, practical, easy-to-use, and modular** integrated STE(A)M Framework.

The Framework will provide necessary guidelines for **primary school teachers** on how to accommodate integrated STEM teaching in primary education; **secondary school teachers** will learn how to teach STEM subjects in contextualized manner and link them with real-life issues or future careers; **heads of schools** will have the opportunity to learn how integrated STEM can be adopted on school level to reach everyone; **EdTech sector** will be able to build on the Framework by introducing new research questions and focusing on STEM careers while at school will result in a highly skilled workforce; **researchers and industry representatives** will have the opportunity to learn how they can support schools more efficiently. Finally, for **policy makers** the Framework will provide concrete, cohesive examples about the value and impact of integrated STEM teaching and policy recommendations that can lead to systemic changes.

Once the aim, the nature and the target stakeholders of the Framework were introduced, **Nikoletta Xenofontos, Department of Education, University of Cyprus**, highlighted the main findings of the **desk research** (State of Play) and **SWOT** analysis that paved the path for the first draft of the Framework. According to the research findings, the pathways to integrated STEM teaching include the collaborative design initiatives by primary and secondary teachers as well as reforms attempted by Ministries of Education and the development of necessary knowledge and skills in the workforce for industry partners. On the other hand, inadequate knowledge and skills of teachers to effectively support integrated STEM teaching as well as segregation of STEM disciplines which still prevails in most curricula and lack of important information on STEM careers for integrated STEM teaching in both primary and secondary education were identified as main obstacles for integrated STEM. Moreover, after creating and **implementing** their own learning scenarios, 11 STE(A)M IT pilot teachers participated in **individual interviews** and **focus group discussions**. Findings of interviews and focus group discussion confirmed the results of the desk research and the SWOT analysis.

After the methodology and the roadmap to the integrated STEM Framework was introduced, participants were given the floor to provide feedback and contextual insights based on their expertise and experience in integrated STEM education.



The main ideas and recommendations gathered during the workshop

Institution (school) level:

- It is vital to allocate **more time for teachers for experimentation** with regards to integrated STEM teaching and **for collaboration with teachers of other disciplines**
- Currently, most curricula do not provide much space for teaching STEM subjects in an integrated manner; therefore, the **curricula must be updated, providing pathways for interdisciplinarity**
- The school books and teachers' support material need to be updated and include more tips and ideas of integration among the various STEM subjects
- It is important to define and agree on **assessment models that are suitable to evaluate the interdisciplinary learning product** (summative → formative) and **include it in the general assessment** (examination). If integrated STEM teaching is not part of the general assessment, there is little possibility it will be taught at all
- Teachers and educators need appropriate **pedagogical support** (entry/reference points for integration) for successfully integrating STE(A)M into their daily teaching practices
- **Different starting points should be anticipated** as well since in some MS STEM disciplines might be taught in more specialised manner (for instance, in primary schools in Hungary)

Policy level:

- It is important to **explore and showcase good practices of integrated STEM teaching that can serve as starting points for wider adoption** (bottom-up approach). Thematic days at school when one topic is addressed across various subjects (The Day of Water) can be considered as an example.
- Integrated STEM teaching should be considered as a **key player in achieving sustainability and green transition** and, consequently, gain more ground within various programmes and projects striving for this goal. While STEM disciplines are strongly connected to real-world issues by their nature, combining STEM teaching with citizenship or socioemotional learning has full potential for changing behaviours and driving young societies towards sustainability and climate action at full speed.
- **To mainstream integrated STEM teaching, it should be firmly rooted in school/national curricula.** STE(A)M needs to exceed extracurricular level for overcoming time constraints (in many cases extracurricular activities mean voluntary work and, eventually, decreased motivation) and for bringing all the teachers on board, not only enthusiasts.



- There is need of **constant dialogue between policy makers (MoEs) and industry that supply into the educational sector**. Industry actors have unique and up-to-date expertise which is currently not leveraged enough.

Industry level:

- **Closely collaborating with schools, industries should promote the potential of STE(A)M careers more actively** since teachers tend to provide all-round, generic education and are not always up to date with practice-related specifications within different fields.
- In ever changing world, it is important to **find and maintain the right balance between teaching specific (workforce related) and transversal, sectorial skills**.
- It is vital to **find and apply creative, innovative real-life approaches to connect students with jobs**. For instance, students may research latest studies on what future careers will be, they might investigate what are the most demanded careers in their country, what jobs have the most potential in future. On the other hand, parents can also be involved in the process by inviting them to come to classrooms and speak about the different occupations they have with pupils.
- All types of educational systems need to be equally supported. There is a need to upgrade the status of vocational education and make sure they become more flexible and easy to adapt.

During the workshop, **Björn Bachmann, Project Coordinator at European Schoolnet**, also introduced the [Career Advisors Network](#) which will be launching in September 2021 aiming to **support career advisers in raising understanding of emerging STEM careers and the skills they require**. During the initial phase, an exclusive network is composed of the STE(A)M IT and Scientix competitions winners and members nominated by Ministries of Education partners, however, later it **will be open to everyone**. The unique Pan-European network of career counsellors established within the interactive STE(A)M IT portal will offer primary and secondary school teachers, educators, career advisers and counsellors **communication and education guidance on STEM skills training** (via webinars, workshops, Q&A sessions and more). Moreover, it will open **opportunities for establishing connections** (via networking and co-creation events) **between various stakeholders**, including STEM professionals, industry partners and policy makers. All members of the network will play an active role as **co-creators and mentors** and, thanks to the **badge system** established within the network, have an opportunity to become **expert career advisers**. There are many activities coming in near future as well, including the launching of newsletter; networking events; STEM careers/skills, teaching resources; communication from industry representatives, Ministries of Education and/or external guest speaker(s); webinars to discuss "wider topics and skills" such as education and communication; workshops on the specific



topics such as videoconferencing tools, creating engaging online content, event organization skills and more...In 2022, the **Publication of Career Advisers Manual and Best Practice Guide** will come out as well.

The [Repository of STEM Jobs Profiles](#) which was launched in September 2020 and is available on STE(A)M IT platform was presented by **Vanessa James, Communications Coordinator at European Schoolnet**. The repository includes textual and audio-visual resources about **exciting STEM-related careers** and is useful for students, parents, teachers, career counsellors or anyone interested in emerging STEM occupations. Currently, the repository contains **28 STEM Job profiles**, each profile comprising of a **career sheet** (outlining necessary skills, tasks, responsibilities, and prospects associated with certain STEM career) and **an interview** with the representative of the occupation in question in video, audio (podcast) and textual formats. Upcoming next is **strengthening the network of collaborators** and **collaboration with industry** which will lead to both the increased number of resources and the diversity of STEM careers presented.

Finally, **professional development opportunities for STEM teachers available under [Scientix](#)** portal were introduced by **Eleni Myrtsioti, Project Coordinator at European Schoolnet**. To ensure everybody has **one access point to everything on STEM education in Europe** and to support teachers to keep us with **everything that is happening on STEM education**, Scientix has been running **the community for science education in Europe** for almost 10 years. It offers **Information/knowledge exchange, training opportunities and serves as a place for community** for STEM teachers. Moreover, Scientix contains **interesting resources for** (integrated) STEM teaching. Currently, there over 3,000 resources, including high quality materials ready to be used in class for free (lesson plans, reports) also webinars, blogposts available under the portal.

The first **STEM MOOCs package** of European Schoolnet Academy created in collaboration with Scientix consisted of three unique MOOCs. Two of them called 'Integrated STEM Teaching' for Primary Schools' and 'Integrated STEM Teaching for Secondary Schools' ran during the period of 26 October – 2 December 2020 (5.5 weeks in total). The high-quality MOOCs focused on **STEM careers and contextualization of real-life problems as well as their solutions and provided guidelines on integrated STEM teaching**. More than 700 primary and close to 800 completed the MOOCs evaluating them very positively.

Learning scenarios presented by STE(A)M IT pilot teachers:

- [More light, less lighting](#) by **Carmelita Cipollone and others**
- [Catapults in STEM and their historical use](#) by **Nikolas Nikolaou and others**



Guest projects presented during the workshop:

- [STEAMonEdu](#)
- [In2STEAM](#)
- [CHOICE](#)

Useful links shared during the workshop:

- [STE\(A\)M IT learning scenarios by pilot teachers](#)
- [Integrated STEM teaching State of Play](#)
- [Repository of STEM Jobs Profiles](#)
- [Guidelines on how to present STEM jobs in classrooms](#)
- [European Schoolnet Academy](#)
- [STEMkey](#) project

More information

- The presentations shared during the workshop can be found at: STE(A)M IT 3rd co-creation workshop coordinator: Evita Tasiopoulou evita.tasiopoulou@eun.org
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<http://steमित.eun.org/steam-it-3rd-co-creation-workshop/>

