

Learning STEAM Through Performing Arts

R2.4 STEAM IDEAS' Square Roadmap

30/10/2025



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Short Description	The document presents the roadmap of the L-STEAM approach. Specific steps and guides on how to operate the STEAM IDEAS Square approach and how school units can realise activities within their settings.		

1. Introduction

1.1. Rationale for STEAM as a Systemic School Transformation

Education systems across Europe are undergoing profound transformation as societies face complex global challenges such as climate change, digital transition, demographic change, and the growing need for inclusive and participatory societies. Schools are increasingly expected not only to transmit knowledge but also to cultivate competencies that enable learners to think critically, collaborate across disciplines, innovate responsibly, and contribute meaningfully to society.

STEAM education—integrating Science, Technology, Engineering, Arts, and Mathematics—offers a powerful pedagogical response to these challenges. By connecting analytical thinking with creativity, technical knowledge with artistic expression, and scientific inquiry with social awareness, STEAM fosters interdisciplinary understanding and equips learners with the competencies required for the 21st century.

Within the L-STEAM project, the integration of performing arts into STEAM education becomes a key driver of innovation. Theatre, music, movement, and storytelling provide powerful mediums through which learners can explore scientific ideas, communicate complex concepts, and develop empathy and collaboration skills. This performative dimension enriches traditional STEM approaches and transforms learning into an embodied, experiential, and participatory process.

The L-STEAM initiative therefore approaches STEAM not merely as a curricular innovation but as a systemic strategy for school transformation. Through the STEAM IDEAS' Square framework, schools are encouraged to evolve into creative learning ecosystems where pedagogy, leadership, community engagement, and institutional development interact dynamically.

1.2. From Curriculum Innovation to Organizational Change

Many existing STEAM initiatives remain limited in scope. They often appear as isolated projects implemented by motivated teachers, extracurricular activities, or short-term pilot programs. While such initiatives are valuable, they rarely lead to long-term institutional transformation.

For STEAM education to generate sustainable impact, it must move beyond individual classroom practices and become embedded in the organizational culture of schools. This requires alignment between pedagogical innovation, school leadership, professional development, and strategic planning.

The L-STEAM Roadmap promotes a shift from activity-based innovation to systemic integration. This involves:



- embedding STEAM approaches within **school development strategies**,
- fostering **collaborative leadership and distributed governance**,
- supporting teachers through **structured professional development**,
- encouraging **transdisciplinary collaboration among educators**, and
- strengthening **partnerships between schools and societal stakeholders**.

Through these mechanisms, STEAM becomes part of the institutional identity of the school rather than an isolated educational experiment.

1.3. Purpose and Scope of the Roadmap

The STEAM IDEAS' Square Roadmap provides a structured yet flexible framework to support schools in implementing STEAM education through performing arts.

The roadmap aims to:

- guide schools through **progressive stages of STEAM integration**,
- support **self-reflection and readiness assessment**,
- facilitate the development of **school-level implementation strategies**,
- align **pedagogical innovation with leadership development**, and
- promote **sustainable institutional change**.

Rather than prescribing a single implementation model, the roadmap adopts a developmental approach, allowing schools to progress at different speeds depending on their context, resources, and existing experience with STEAM education.

The roadmap is closely connected to the [L-STEAM Competence-Based Framework](#), which defines the key competencies that students develop through STEAM learning environments enriched by performing arts. The roadmap is developmental rather than prescriptive. It supports differentiated progression across four school typologies: Starter, Enabled, Advanced, and Master.

1.4. Target Users

The STEAM IDEAS' Square Roadmap is designed to support a wide range of stakeholders involved in educational innovation and school development.

Primary users include:

- **Teachers and pedagogical teams**, seeking to integrate transdisciplinary and creative learning approaches into their teaching practice.
- **School leaders and management teams**, responsible for strategic planning and institutional development.
- **STEAM coordinators**, facilitating cross-disciplinary collaboration within schools.
- **Teacher training institutions**, supporting educators' professional development.
- **Regional education authorities and policymakers**, promoting innovation within education systems.



The roadmap is particularly valuable for schools interested in exploring **performing arts as a catalyst for STEAM education**, enabling the development of creativity, empathy, collaboration, and systems thinking among learners.

2. Conceptual Foundations

2.1. STEAM Education as a Developmental and Leadership Approach

STEAM education represents more than an interdisciplinary teaching method; it embodies a broader educational philosophy that emphasizes creativity, inquiry, collaboration, and innovation. By combining scientific reasoning with artistic exploration, STEAM learning environments encourage students to engage with complex problems through multiple perspectives.

In the L-STEAM approach, STEAM education is understood as a **developmental process** that involves not only students but also teachers, school leaders, and the wider educational community. Schools evolve through progressive stages of STEAM integration, gradually developing the capacity to support transdisciplinary learning and collaborative innovation.

This transformation requires **educational leadership** that encourages experimentation, supports teacher collaboration, and fosters a culture of continuous improvement. School leaders play a critical role in creating conditions that allow STEAM initiatives to flourish, including allocating time for teacher collaboration, supporting professional development, and promoting partnerships with external stakeholders.

Through this perspective, STEAM becomes both a **pedagogical and organizational strategy**, enabling schools to evolve into creative learning environments that prepare students for the challenges of the future.

Furthermore, L-STEAM framework illustrates how STEAM education serves not only as a transdisciplinary, inquiry-based learning model, but also as a **catalyst for leadership development (Figure 1)**. Through the integration of critical thinking, digital fluency, critical and systems thinking, empathy, and analytical decision-making, students engage in domains that nurture key competencies such as creative problem solving, collaboration, communication, resilience, and socio-cultural awareness. These domains collectively underpin the cultivation of leadership traits—including visioning, emotional intelligence, persuasive communication, and purpose-driven action. The **STEAM IDEAS' Square Roadmap positions STEAM as a transformative approach to developing future-ready citizens**: community changemakers, social entrepreneurs, ethical technologists, and innovation leaders. This model supports the thesis that STEAM is not merely curricular—it is fundamentally developmental, empowering learners to navigate and lead in complex, interdisciplinary global environments.



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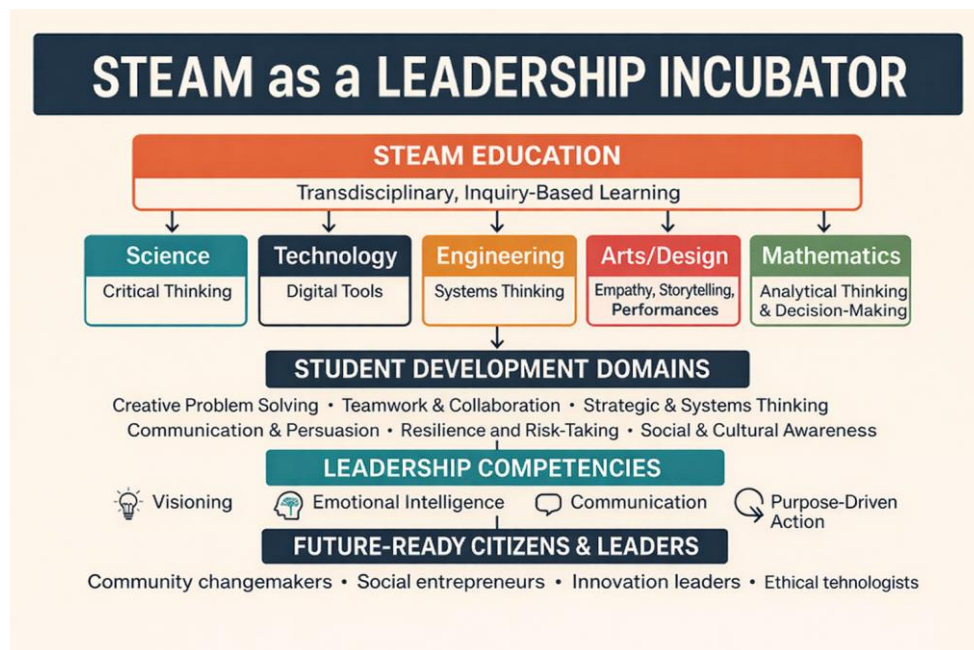


Figure 1: The STEAM Approach as a Leadership Incubator (created by M. Sotiriou 2025)

2.2. Design Thinking in Educational Transformation (Feel–Imagine–Create–Share)

The STEAM IDEAS' Square framework is grounded in **Design Thinking**, a methodology widely used in innovation processes that emphasizes empathy, creativity, experimentation, and reflection. Design Thinking has increasingly been adopted in educational contexts because it encourages learners to approach complex problems in collaborative and creative ways, while also supporting iterative learning and reflective practice (S. Sotiriou et al, 2017). Within the L-STEAM project, this approach is adapted to educational environments in order to integrate scientific inquiry, artistic expression, and societal engagement.

The STEAM IDEAS' Square framework provides a structured pedagogical process that guides both educators and students through stages of exploration, ideation, experimentation, and communication. In doing so, it supports a transformation of traditional learning environments from teacher-centered instruction toward student-centered, inquiry-based, and collaborative learning ecosystems. By connecting scientific knowledge with creative practices and community engagement, the framework contributes to educational transformation at multiple levels: pedagogical, institutional, and societal.

Within the L-STEAM pedagogical model, this process is represented through four interconnected phases:

Feel

Students and educators begin by exploring real-world challenges and societal needs. Through observation, dialogue, and research, learners develop empathy and awareness of the issues



that shape their communities. This phase encourages students to understand scientific and technological problems not only as abstract concepts but as phenomena that affect everyday life and social well-being.

From an educational transformation perspective, the Feel stage promotes contextual and socially relevant learning. It encourages schools to move beyond isolated disciplinary teaching and instead connect learning with authentic societal challenges such as environmental sustainability, public health, technological innovation, and social inclusion. By engaging students in identifying problems that matter to their communities, the framework strengthens motivation and fosters a sense of responsibility toward society.

Imagine

During the Imagine phase, learners generate ideas and possible solutions through brainstorming, artistic exploration, and transdisciplinary collaboration. Creative processes such as storytelling, improvisation, and conceptual design encourage imaginative thinking and allow students to approach problems from multiple perspectives.

In the STEAM IDEAS' Square framework, performing arts play a particularly important role at this stage. Theatre, music, and movement provide expressive mediums through which students can visualize scientific ideas, explore alternative scenarios, and develop innovative solutions. The integration of artistic practices enables learners to think beyond traditional disciplinary boundaries and supports the development of creative and critical thinking competences, as identified in the L-STEAM Competence-Based Framework (D2.2).

From an educational transformation perspective, this phase supports the transition from knowledge transmission to knowledge creation, where students become active contributors to the learning process.

Create

In the Create phase, students transform ideas into tangible outcomes. These outcomes may take different forms depending on the learning context, including theatrical performances, musical compositions, scientific prototypes, digital artefacts, or transdisciplinary projects that combine artistic and scientific elements.

This phase emphasizes experimentation and hands-on learning. Students engage in collaborative processes where they test ideas, refine their concepts, and integrate knowledge from different STEAM disciplines. The iterative nature of the Create phase mirrors the processes used in scientific research and artistic production, reinforcing both analytical and creative skills.

At the institutional level, the Create phase contributes to educational transformation by encouraging schools to adopt project-based and experiential learning approaches. These approaches support deeper learning and foster the development of transversal competences such as collaboration, adaptability, and problem-solving.

Share

The final stage involves presenting outcomes to a wider audience. Performances, exhibitions, digital presentations, and community events (e.g., [Learning Science Through Theater](#)

Festival) allow students to communicate their ideas, reflect on their learning process, and engage with societal stakeholders.

This stage is particularly important in the STEAM IDEAS' Square framework because it strengthens the connection between schools and their communities. By sharing their projects with external audiences—including parents, local organisations, researchers, artists, and policymakers—students experience the broader social relevance of their work.

From an educational transformation perspective, the Share phase contributes to the development of open schooling practices, where schools become active participants in local innovation ecosystems. It also promotes communication skills, public engagement with science, and collaborative dialogue between education, culture, and society.

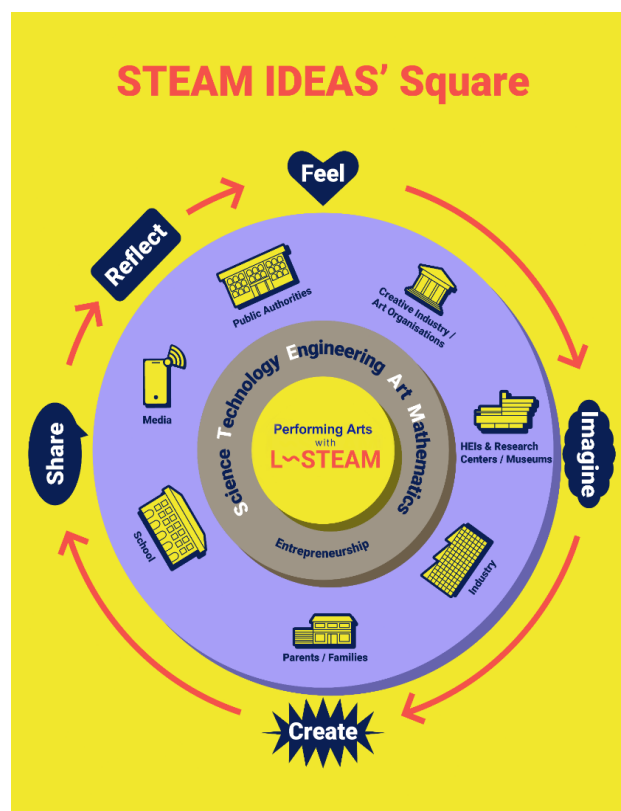


Figure 2: The STEAM IDEAS's SQUARE concept within L-STEAM project

Iterative Learning and Educational Transformation

The Feel–Imagine–Create–Share cycle is not a linear process but a continuous loop that encourages reflection and improvement. Students revisit earlier stages as they refine their ideas, incorporate feedback, and deepen their understanding of the problem they are addressing (**Figure 2**).

Through this iterative process, the STEAM IDEAS' Square framework supports a transformation of educational practice in several ways:



- **It promotes student-centered learning** by positioning learners as active participants in knowledge creation.
- **It encourages transdisciplinary collaboration among teachers and students** across STEAM disciplines.
- **It integrates performing arts as a catalyst for creativity and communication** in science learning.
- **It strengthens connections between schools and society**, supporting **open schooling** and community engagement.
- **It fosters the development of key 21st-century competences**, including creativity, critical thinking, collaboration, and systems thinking.

By combining these elements, the **STEAM IDEAS' Square framework provides a holistic approach** to educational innovation that supports both pedagogical change and institutional transformation.

2.3. Whole School Approach and Open Schooling

The STEAM IDEAS' Square framework adopts a **Whole School Approach**, recognizing that meaningful and sustainable educational innovation requires engagement across all levels of the school ecosystem. Educational transformation cannot be achieved solely through isolated classroom interventions or individual teacher initiatives. Instead, it requires coordinated efforts that involve school leadership, teachers from different disciplines, students, families, and external partners working together toward shared educational goals.

Within the L-STEAM project, the STEAM IDEAS' Square framework and its accompanying roadmap provide a structured pathway through which schools can gradually embed transdisciplinary STEAM practices into their institutional culture. Rather than focusing exclusively on teaching methods within individual classrooms, the framework promotes systemic change by encouraging collaboration among multiple actors within and beyond the school environment.

In this context, the Whole School Approach encourages collaboration among:

- **Teachers from different disciplines**, who work together to design transdisciplinary learning experiences that integrate science, technology, engineering, arts, and mathematics. Such collaboration supports the development of richer learning environments in which students can explore complex topics from multiple perspectives.
- **School leadership teams**, who play a key role in creating supportive conditions for innovation. By incorporating STEAM priorities into school development plans, allocating time for transdisciplinary collaboration, and supporting professional development activities, school leaders ensure that STEAM initiatives are sustainable and aligned with the broader educational vision of the institution.
- **Students and families**, who become active participants in the educational process. Students are encouraged to contribute ideas, participate in collaborative projects, and reflect on societal challenges through creative and scientific exploration. Families, in turn, can engage with school activities through performances, exhibitions, and community events that showcase student work.



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- **Cultural organizations**, including theatres, museums, arts collectives, and creative practitioners, who contribute artistic expertise and creative methodologies. These collaborations enrich STEAM learning by introducing students to diverse forms of artistic expression and enabling them to communicate scientific ideas through creative media.
- **Scientific and technological communities**, such as universities, research centres, science communication organisations, and technology companies, who provide expertise, mentorship, and real-world perspectives on scientific innovation.

By bringing these actors together, the **STEAM IDEAS' Square Roadmap supports the development of collaborative learning ecosystems in which education extends beyond traditional classroom boundaries.**

This perspective strongly **aligns with the Open Schooling model** ([S. Sotiriou et al, 2017](#)), an educational paradigm promoted by European research and innovation policies that aims to strengthen the connection between schools and society. Open schooling encourages schools to become hubs of collaboration where educators, researchers, industry partners, and community organisations work together to address real-world challenges.

Through the STEAM IDEAS' Square roadmap, schools are encouraged to develop partnerships with:

- universities and research institutions that provide scientific expertise and research-based learning opportunities;
- creative industries and cultural organisations that support artistic exploration and science communication;
- industry and technology partners that offer insights into innovation and future career pathways;
- civil society organisations that connect educational activities with societal challenges such as sustainability, social inclusion, and digital transformation.

These partnerships **enable schools to become active participants in local innovation ecosystems**, where education, culture, science, and society intersect.

In practical terms, the roadmap facilitates open schooling by encouraging schools to organise activities such as public performances, STEAM festivals, community exhibitions, citizen science projects, and collaborative workshops with external stakeholders. These initiatives allow students to share their work with wider audiences while engaging in meaningful dialogue with experts, artists, and community members.

Such interactions significantly enrich learning experiences by exposing students to authentic real-world challenges and demonstrating how scientific knowledge and creative thinking can contribute to solving societal problems. **Students are therefore not only consumers of knowledge but also active contributors** to community innovation and cultural dialogue.

Furthermore, by integrating performing arts within STEAM education, the STEAM IDEAS' Square Roadmap enhances the accessibility and communicative power of science. Artistic performances, storytelling, and creative expression help translate complex scientific concepts into forms that can be easily understood and appreciated by broader audiences. This



contributes to the development of science communication skills, which are increasingly recognized as essential competencies in contemporary education.

Ultimately, the **STEAM IDEAS' Square framework and roadmap support a transformation of schools into open, collaborative, and creative learning environments**. By combining the Whole School Approach with the principles of open schooling, the L-STEAM methodology fosters educational ecosystems in which learning is transdisciplinary, socially relevant, and connected to the wider world.

2.4. Alignment with the European Education Area and EU Policy Priorities

The L-STEAM initiative aligns closely with key priorities of the European Education Area (EEA), which promotes the development of inclusive, innovative, and high-quality education systems capable of preparing learners for the social, environmental, and technological challenges of the 21st century. Within this context, the STEAM IDEAS' Square framework and its implementation roadmap provide a practical educational model that supports several strategic objectives identified in European policy frameworks, including the European Commission's "[STEM Education Strategic Plan](#)".

The STEM Education Strategic Plan emphasises the need to strengthen STEM education across Europe in order to address skills shortages, promote innovation, and equip citizens with the competences required for the digital and green transitions. One of the key challenges identified by the plan is the fragmentation of STEM education and the limited integration of interdisciplinary approaches within school systems. The STEAM IDEAS' Square framework responds directly to this challenge by providing a structured pedagogical and institutional model that integrates STEM disciplines with the arts and humanities, thereby fostering interdisciplinary and transdisciplinary learning environments.

In particular, the STEAM IDEAS' Square framework contributes to several European policy priorities.

Strengthening STEM education and digital skills

The roadmap supports the development of scientific and technological competences through inquiry-based and project-based learning approaches. By integrating performing arts with science and technology, students engage with STEM concepts in ways that are both intellectually stimulating and emotionally engaging. Activities such as science theatre performances, musical representations of scientific data, or digital storytelling projects encourage learners to explore scientific ideas creatively while simultaneously developing digital literacy skills. This approach helps make STEM education more accessible and attractive to a wider range of students, addressing one of the central goals of the STEM Education Strategic Plan: increasing participation and engagement in STEM learning.

Promoting creativity and cultural awareness

European education policies increasingly recognise creativity and cultural expression as essential components of innovation and knowledge societies. By integrating performing arts within STEAM education, the L-STEAM approach bridges scientific learning with artistic and cultural practices. Students learn to communicate scientific ideas through narrative,



performance, music, and visual expression, strengthening both creativity and cultural awareness. This integration reflects the European Commission's emphasis on combining scientific excellence with cultural and creative industries to support innovation and societal development.

Supporting green and sustainable development

The European Green Deal and related education initiatives highlight the importance of sustainability education and environmental awareness. The STEAM IDEAS' Square framework encourages students to explore environmental challenges through transdisciplinary projects that combine scientific investigation with artistic communication. For example, students may develop performances or creative projects addressing climate change, biodiversity, or renewable energy. By linking environmental science with artistic storytelling and public engagement, the framework promotes deeper understanding of sustainability challenges and encourages active participation in environmental solutions.

Fostering inclusive and equitable education

Another priority of the European Education Area is ensuring equitable access to high-quality education for all learners. The STEAM IDEAS' Square approach supports inclusivity by providing diverse entry points into scientific learning. Artistic and creative activities allow students with different learning styles, cultural backgrounds, and interests to engage with scientific topics in meaningful ways. This inclusive approach is particularly effective in encouraging participation among groups traditionally underrepresented in STEM fields, including girls and students from diverse socio-economic backgrounds.

Encouraging lifelong learning and innovation

The L-STEAM roadmap promotes a culture of continuous learning, experimentation, and collaboration within schools. By adopting the Feel–Imagine–Create–Share cycle, learners develop skills associated with innovation processes, including problem identification, idea generation, prototyping, and communication. These competencies are essential for lifelong learning and align with European policies that emphasise creativity, entrepreneurship, and innovation as key drivers of economic and societal development.

Furthermore, the roadmap encourages schools to establish partnerships with universities, research institutions, creative industries, and local organisations. These collaborations strengthen the connection between education, research, and innovation ecosystems, which is a central objective of the STEM Education Strategic Plan.

The approach adopted in the L-STEAM project is also consistent with the findings of the [Road-STEAMer project](https://www.road-steamer.eu/steam-edu-roadmap/), a Horizon Europe initiative that developed a comprehensive roadmap for STEAM education in Europe (<https://www.road-steamer.eu/steam-edu-roadmap/>). Road-STEAMer highlights the importance of integrating the arts and humanities into STEM education in order to foster creativity, systems thinking, and socially responsible innovation. The project emphasizes that STEAM approaches can support the development of competences needed to address complex societal challenges by combining scientific knowledge with cultural, ethical, and creative perspectives. In this context, the STEAM IDEAS' Square framework and its implementation roadmap provide a practical educational model that operationalises several of Road-STEAMer's recommendations, particularly those related to



interdisciplinary collaboration, learner-centered pedagogies, open schooling practices, and the integration of cultural and creative approaches within science education.

By integrating performing arts into STEAM education, the L-STEAM approach also supports European strategies that highlight the role of culture and creativity as drivers of innovation and societal engagement. Artistic expression provides powerful tools for communicating scientific knowledge to wider audiences and for fostering dialogue between science and society. In this way, the STEAM IDEAS' Square framework not only enhances STEM learning but also contributes to the broader goal of building a more innovative, inclusive, and culturally vibrant European education landscape.

Overall, the **STEAM IDEAS' Square framework and roadmap offer a practical implementation model** that translates European policy priorities into concrete educational practices, helping schools across Europe strengthen STEM education while simultaneously promoting creativity, collaboration, and societal engagement.

3. The STEAM IDEAS' Square Roadmap

3.1. Roadmap Overview and Logic

The STEAM IDEAS' Square Roadmap provides a structured pathway that supports schools in gradually integrating STEAM education into their institutional practices. Rather than presenting STEAM as a single set of teaching activities, the roadmap approaches it as a process of school development and pedagogical transformation. In this sense, STEAM implementation is not limited to individual classrooms but is embedded within broader school strategies, leadership practices, and collaborative learning cultures.

The roadmap recognises that schools operate in diverse educational, cultural, and organisational contexts. As a result, institutions may begin their STEAM journey at different stages of readiness and with different levels of experience in transdisciplinary teaching. To accommodate this diversity, the roadmap adopts a developmental model based on school typologies ([L-STEAM Competence-Based Framework](#)), allowing institutions to evolve progressively from initial experimentation to systemic integration of STEAM approaches. This gradual progression enables schools to build capacity over time, strengthen teacher collaboration, and integrate STEAM principles into their long-term development strategies ([R2.3 The L-STEAM Strategies](#)).

The roadmap integrates several complementary components that together support sustainable educational transformation:

- **school self-reflection**, allowing institutions to assess their current practices and readiness for STEAM integration;



- **strategic and development planning**, through which schools incorporate STEAM priorities into their school development plans and define clear objectives for innovation;
- **teacher professional development**, ensuring that educators acquire the pedagogical competences required to implement interdisciplinary STEAM learning;
- **implementation of STEAM learning activities**, where students engage in inquiry-based and creative projects that integrate science, technology, engineering, arts, and mathematics;
- **continuous evaluation and improvement**, enabling schools to reflect on their experiences, scale successful practices, and adapt their strategies over time.

These elements interact dynamically to support sustainable institutional transformation, helping schools move from isolated innovation initiatives to a coherent STEAM-oriented learning ecosystem.

The roadmap is operationalised through a Design Thinking cycle, illustrated in Figure 3 (STEAM IDEAS' Square Roadmap). The model is structured around four interconnected phases—Feel, Imagine, Create, and Share—which guide schools and educators through a process of contextual understanding, ideation, experimentation, and reflection.

At the centre of the roadmap lies the STEAM IDEAS' Square framework, which integrates the five core dimensions that underpin the L-STEAM pedagogical model: Inquiry, Design Thinking, Empathy, Action, and Systems Thinking. These dimensions guide the design and implementation of learning activities throughout the roadmap cycle. Systems Thinking, represented as the foundation of the model, highlights the interconnected nature of educational innovation and encourages schools to consider how pedagogical practices, organisational structures, and community partnerships interact.

The roadmap ultimately contributes to school development and institutional transformation. As illustrated in the lower section of the model, the implementation of the STEAM IDEAS' Square roadmap can strengthen school leadership, support continuous professional learning among teachers, and promote systemic change in educational practices. Through this process, schools progressively evolve into collaborative learning ecosystems that integrate scientific inquiry, creative expression, and societal engagement.

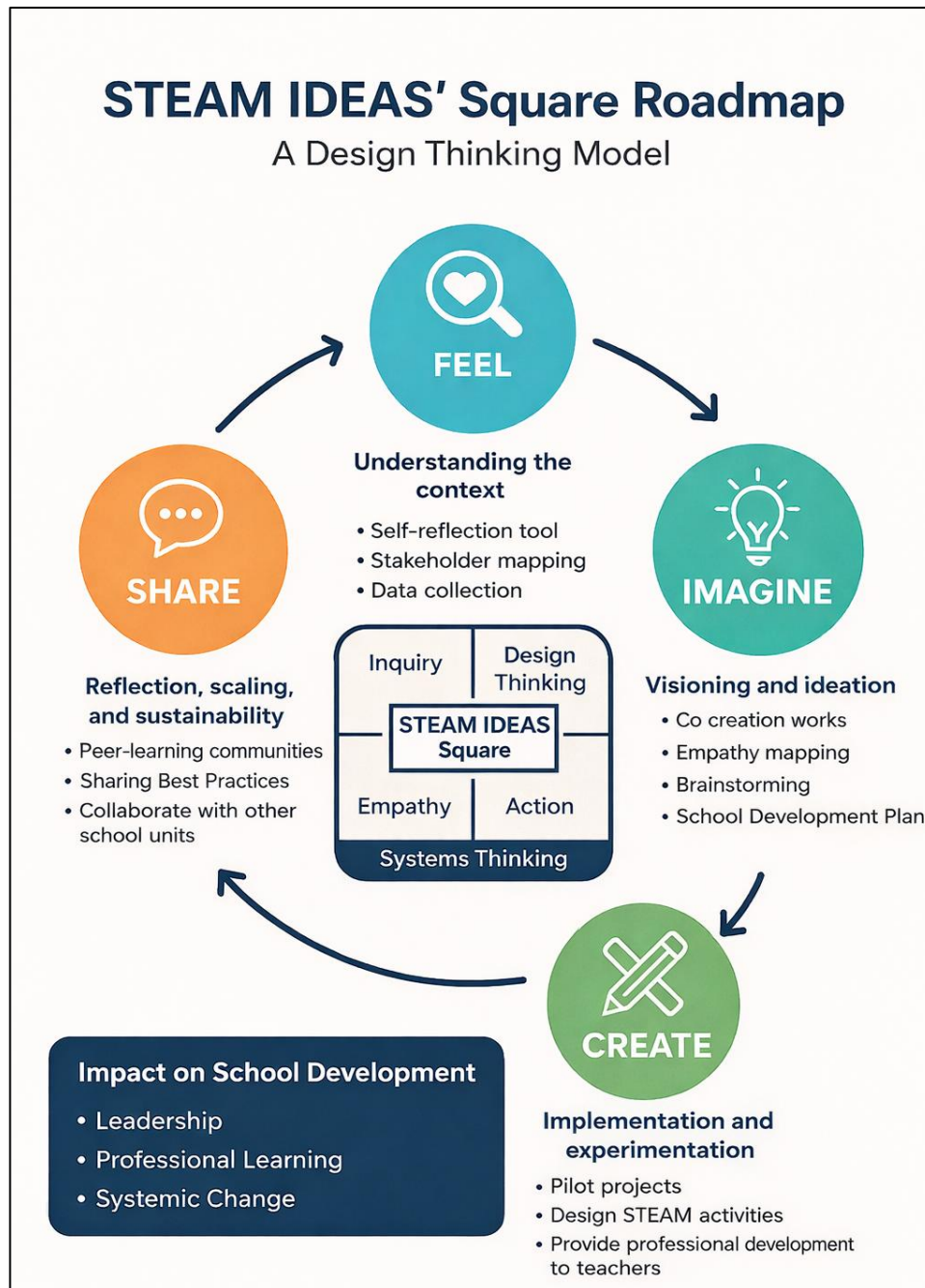


Figure 3: The figure illustrates the iterative process guiding schools in the implementation of STEAM education through the phases Feel, Imagine, Create, and Share. Each phase supports key activities such as contextual analysis, ideation and strategic planning, implementation of STEAM activities, and reflection and scaling of successful practices. At the centre of the model lies the STEAM IDEAS' Square framework, integrating the five dimensions—Inquiry, Design Thinking, Empathy, Action, and Systems Thinking—which underpin interdisciplinary learning and support sustainable school development, professional learning, and systemic educational change.

3.2. School STEAM Journey

Each School Unit has to register and complete its profile in the [NEXT STEP/L-STEAM Self-Reflection Tool](#), so to effectively participated in the project community.

To be part of a STEAM IDEAS' Square Community means to be supported in every step of the way, by accessing a set of community building tools to facilitate cooperation and networking between the participating schools. The sharing of resources and experiences is encouraged in order to promote collaboration and maximize resources, besides learning from others and gain knowledge that we may not have otherwise. Aside from cooperation between teachers and students, it is encouraged the connection and participation of artists, local communities, industry and researchers. This can create a positive learning environment that promotes students' engagement with their peers and an active role in their education. The focus is not only on the integration of external resources into syllabi, but also on subsequent adoption of the modernization of the school organization, school cooperation with external players as well as the teachers' professional development.

The Community Support Environment (<https://srt.the-next-step.eu/>) not only introduced to best practices proposed by the project but also to the ones generated by the school units. This content was in line with the proposed approach and introduced the user to practices that engage key stakeholders. School-based projects and activities are the key elements of this environment.

The main steps that the school unit should take following the proposed Journey to STEAM education are the following:

1. The school unit need to identify the STEAM Status at the specific period (Using the NEXT STEP/L-STEAM Self-Reflection Tool)
2. According to the status will have to follow the proposed strategies ([R2.3 The L-STEAM Strategies](#))
3. The School Unit should develop a plan in order to achieve the strategy that needs to be followed
4. The School Unit should develop or follow scenarios / activities (<https://lsteam.eu/scenarios-of-use/>) in order to achieve and improve its status and follow the specific strategy
5. After a period of at least 6 months (recommended to be a full school year) the school unit will have to measure its status again in order to identify the improvement (Using the NEXT STEP/L-STEAM Self-Reflection Tool)

The steps above are illustrated in Figure 4.

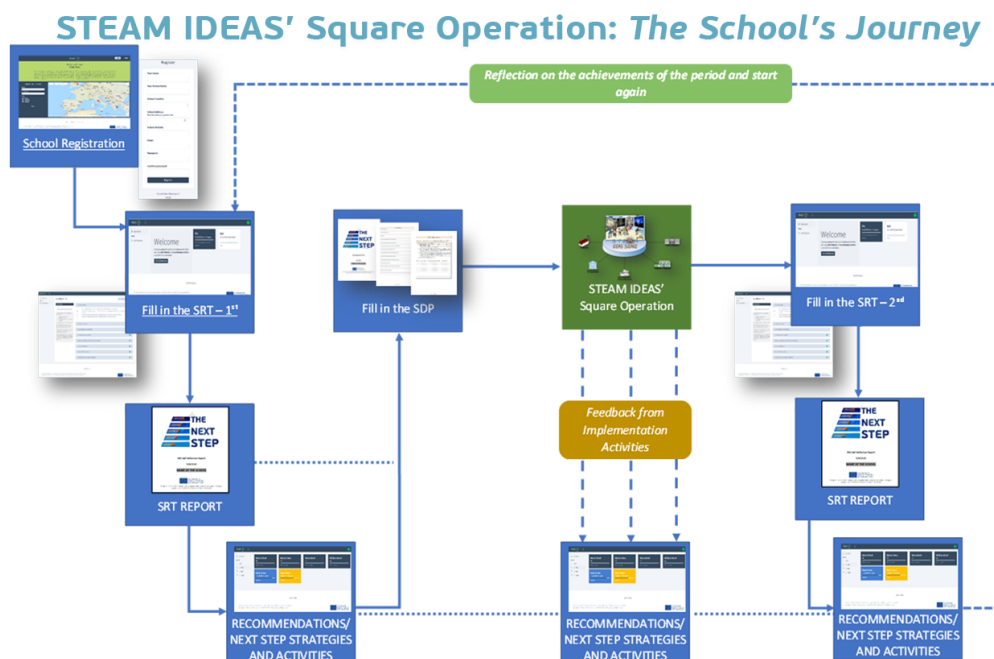


Figure 4: The STEAM IDEAS' Square Operation

3.2.1. School Readiness and Self-Reflection Mechanism

3.2.1.1. Register to the NEXT STEP/L-STEAM SRT

Steam Ideas Square (SIS) requires a reflection process that helps the user (school unit) understand its status. In order to track the progress, **a registration of School unit is needed from one teacher that is suggest to be the Head of the School Unit**. The school units are provided with specific guides as well as dedicated workshops in order to start using the tool. Below, in Figure 5 are some snapshots of the guides that were provided to the school units.

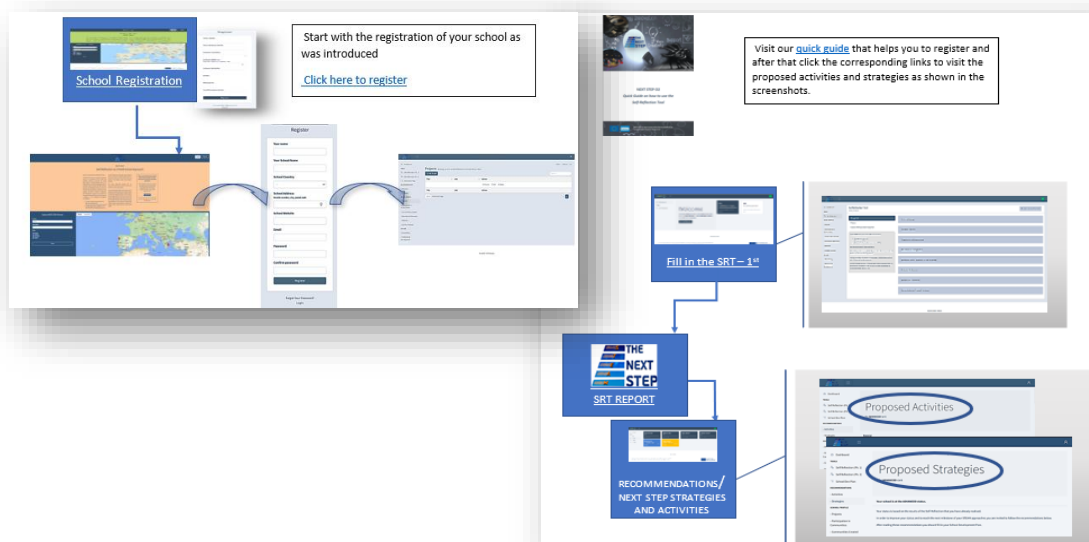


Figure 5: The process to register in the SRT and start the STEAM IDEAS' Square Operation

3.2.1.2. Define the School Unit Status

As a first step it was important to understand the status of the school unit (The School Typology). The School Typologies are identified by filling in the NEXT STEP/L-STEAM SRT according to approaches that the school is following at the specific moment in 3 levels: **Management, Process and Teachers Professional Development.**

There are four school typologies that L-STEAM project proposes to be used during the project with the participating schools from the 4 participating countries (Malta, Greece, Cyprus and Portugal). These school typologies are presented in Table 1. Schools, according to their reflection, will be characterized according to their STEAM status to four categories: Starter, Enabled, Advanced or Master.

Table 1: The four school typologies according to the STEAM characteristics

STARTER	ENABLED	ADVANCED	MASTER
Schools that are planning to incorporate STEAM educational in their classrooms.	Schools that have implemented at least one STEAM education activity by means of collaboration between teachers of various STEAM disciplines.	Schools that have achieved a high degree of STEAM education, by actively promoting collaboration between teachers of various STEAM disciplines in e.g., a project-based learning approach. ICT tools are integrated in their practices. Cooperation with community stakeholders and other external partners on specific STEAM activities/projects has been established	Schools that have STEAM learning as a common practice among their teachers and can provide best practice examples as well as recommendations on how to implement relevant activities. These schools can act as agents of STEAM Education. The school has established systematic collaboration with community stakeholders and other external partners on specific STEAM activities/projects.

3.2.2. School Development Plans

Schools are living spaces. Sometimes it is hard to go up the stream. But towards this, the STEAM IDEAS' Square Roadmap offers the user with predefined descriptions on the profile of the status they are to the status they wish to become. School units have to think on how can adopt the approach in the process of pursuing their achievements by writing down a development plan in bullet-points (activities that they need to start realising). Figure 6, illustrate how the school unit could take advantage of the recommended strategies to follow in order to develop the school unit's Development Plan towards STEAM integration.

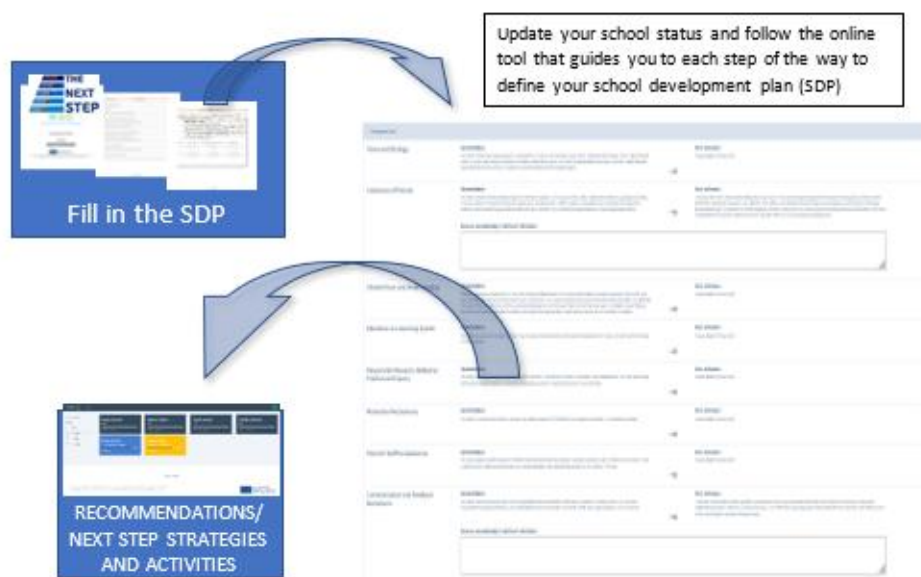


Figure 6: The process to develop a plan following the STEAM IDEAS' Square Approach

3.2.3. Selecting and/or Developing STEAM Activities

After the school units developed their plans they should start thinking on how to enhance their teaching strategies through STEAM Activities. Two ways are offered that either could use them individually or combine:

- **Start from scratch.**
Study the principles of design thinking, and see how you can adapt the needs of your class to the proposed procedure. Choose the timespan of your approach and start filling-in the fields of your own scenario/STEAM activity into the [L-STEAM Scenario of Use template here](#).
- **Build on a proposed STEAM Activity**
Follow the activities of a proposed approach that the project has to offer. You can adapt on the way and enhance the contents of any activity as long as it respects the design-thinking elements that the project suggests. All the proposed scenarios of use, according to the status that you will identify from the Self-Reflection procedure, can be found [here](#). Or you can use the table below:

Table 2: The proposed L-STEAM Scenarios of use

School Typology	Proposed STEAM Activities
STARTER	• Stand Up Comedy • Soundscape story • The dance of Earth, Moon and Sun

ENABLED	• Playing with sounds: an exploration of how sound is produced and how it travels around us • Body Symphony • The science of shadows
ADVANCED	• Designing and exoplanet mission
MASTER	• Learning science through theatre • Soundscape story • Sonification practice

After choosing one of the above school units start their implementation.

3.2.4. Implementing STEAM Activities

During the implementation phase, school units were following the steps illustrated in Figure 7, by using also several tools for assessing their effectiveness of teaching, e.g., pre and post questionnaires for teachers and students.

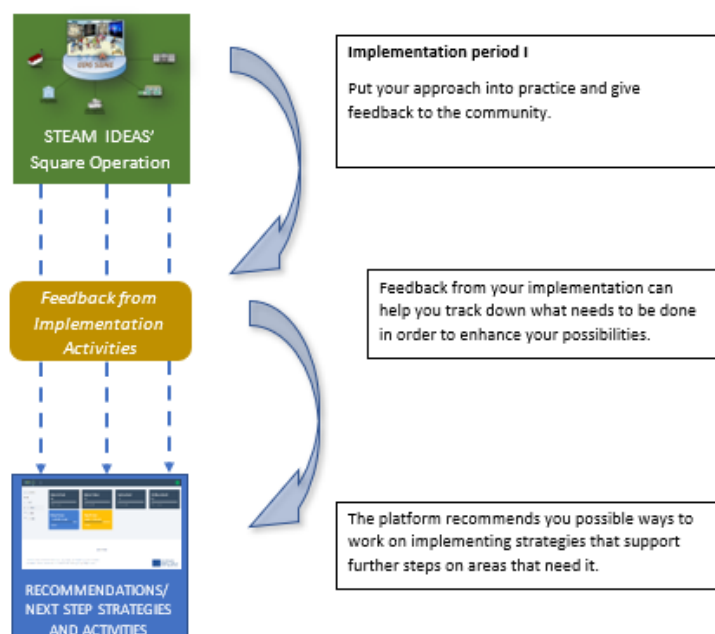


Figure 7: The process for the implementation of the STEAM IDEAS' Square Approach

3.2.5. Redefine the School Unit's status by filling in the Self-Reflection again

The final step that school units took was a reflection on how they have improved by realising the planned activities. Also, this was the main measurement in order to demonstrate the

effectiveness of the STEAM IDEAS' Square approach. Figure 8 illustrates the steps that the school units had to take in order to finalise their journey.

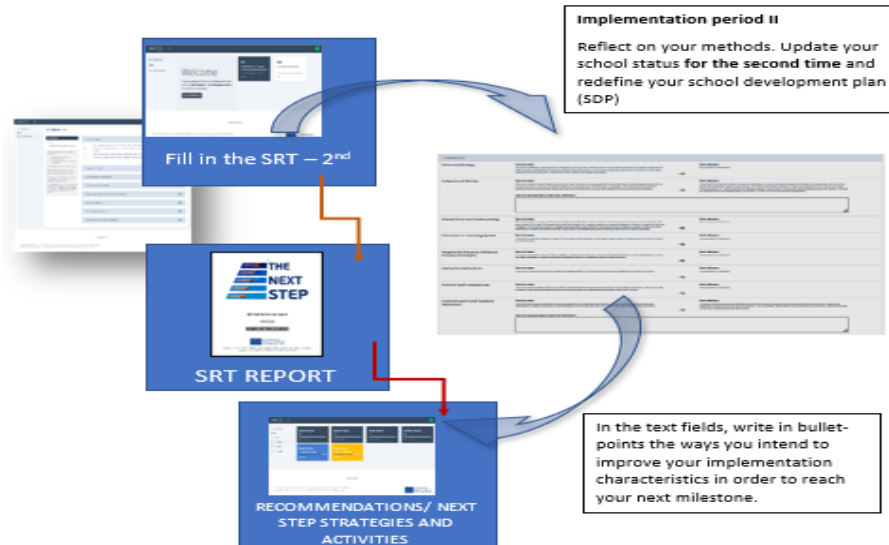


Figure 8: The final step for the STEAM IDEAS' Square Approach in order to reflect on its effectiveness.

3.2.6. Continuous Teachers' Professional Development

Teacher professional development is a fundamental component of the STEAM transformation process. The successful integration of STEAM education requires educators to adopt new pedagogical approaches that go beyond traditional subject-based teaching and support interdisciplinary, inquiry-driven, and creative learning environments. In this context, teachers play a central role as facilitators of learning experiences that connect scientific exploration with artistic expression, collaborative problem-solving, and real-world challenges.

To effectively implement such approaches, educators require opportunities to develop competencies related to:

- **transdisciplinary pedagogy**, enabling them to collaborate with colleagues from different subject areas and design learning activities that integrate science, technology, engineering, arts, and mathematics;
- **inquiry-based learning**, supporting the development of student-centered learning environments where learners investigate problems, conduct research, and construct knowledge through exploration;
- **creative facilitation techniques**, which encourage imaginative thinking, experimentation, and the use of artistic practices such as storytelling, theatre, music, and design in the learning process;
- **integration of digital and artistic tools**, allowing educators to combine technological resources with creative media to enhance STEAM learning experiences.



Figure 9: L-STEAM project, a comprehensive professional development framework

Within the L-STEAM project, a comprehensive professional development framework has been developed (Figure 9) to support teachers in acquiring these competences and applying them in their classroom practices. The project provides a variety of structured learning opportunities that combine theoretical understanding with practical experimentation and collaborative exchange.

One of the key initiatives supporting teacher professional learning is the [L-STEAM Summer Schools](https://esia.ea.gr/l-steam-summer-school/), such as the one organised in July 2025 (<https://esia.ea.gr/l-steam-summer-school/>). These Summer Schools bring together educators, researchers, artists, and STEAM practitioners from different countries to explore innovative methodologies for integrating performing arts into science education. Through workshops, collaborative design sessions, and practical demonstrations, participants engage with interdisciplinary teaching strategies



that combine scientific inquiry with creative expression. The Summer School environment also provides a valuable space for international networking and the exchange of best practices among educators working in diverse educational contexts.

In addition to the Summer School, the L-STEAM project offers **targeted training programmes**, such as the [five-session training series](#) designed to support teachers in implementing STEAM methodologies in their classrooms. These workshops provide structured guidance on topics such as interdisciplinary curriculum design, creative STEAM activities, and the integration of performing arts into science teaching. The training sessions are complemented by **mentoring and peer-support mechanisms**, allowing educators to reflect on their teaching practices and receive feedback while experimenting with new approaches.

Another important element of the L-STEAM professional development ecosystem is the [L-STEAM Community hosted within the School of the Future platform](#). This online environment enables teachers to connect with other educators, share resources and experiences, and participate in ongoing discussions related to STEAM education. Through this community, teachers can access educational materials, exchange ideas, and collaborate on the development of new learning activities. The platform therefore supports the creation of **peer-learning networks** that extend professional development beyond formal training events. Professional development activities within the L-STEAM framework may therefore include a combination of:

- international **summer schools and intensive training events**,
- thematic **workshops and training series**,
- **mentoring and peer-support activities**,
- **peer-learning communities and online collaboration platforms**, and
- **collaborative design sessions** where teachers co-create STEAM learning experiences.

Through these activities, teachers progressively develop the confidence and competencies needed to facilitate interdisciplinary learning environments that integrate scientific inquiry, artistic creativity, and collaborative problem-solving. As educators engage in continuous professional learning and experimentation, they become key agents of change within their schools, capable of supporting the broader institutional transformation envisioned by the STEAM IDEAS' Square roadmap.

Ultimately, teacher professional development within the L-STEAM project contributes to the creation of **sustainable communities of practice**, where educators collaborate, innovate, and continuously refine their pedagogical approaches. These communities play a crucial role in ensuring that STEAM education becomes embedded within everyday teaching practices and that schools evolve into dynamic learning ecosystems that support both scientific exploration and creative expression.



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4. L-STEAM Roadmap Contribution and Conclusions

The STEAM IDEAS' Square Roadmap offers a comprehensive and operational framework that supports schools in moving from fragmented innovation towards **systemic and sustainable STEAM integration**. By combining pedagogical transformation with organisational development, the roadmap enables schools to evolve into **creative, inclusive, and future-oriented learning ecosystems**.

Importantly, the L-STEAM approach aligns closely with key European policy priorities, particularly those outlined within the **European Education Area**, the **Digital Education Action Plan**, the **European Green Deal**, and the **European Commission's STEM Education Strategic Plan**. These policies highlight the urgent need to strengthen STEM competences, foster innovation capacity, and ensure that education systems are equipped to address the **digital, green, and societal transitions** shaping Europe's future.

Within this policy context, the STEAM IDEAS' Square Roadmap contributes in several strategic ways:

- It **addresses the fragmentation of STEM education** identified by the STEM Education Strategic Plan by promoting **transdisciplinary approaches** that integrate science with arts, culture, and creativity.
- It supports **increased participation and inclusivity in STEM**, offering multiple entry points for learners with diverse interests and backgrounds, thus contributing to widening access and reducing gender and social gaps.
- It reinforces the development of **key competences for lifelong learning**, including critical thinking, creativity, collaboration, and problem-solving, which are central to EU education and skills agendas.
- It strengthens the role of schools within **innovation ecosystems**, in line with the Open Schooling and Responsible Research and Innovation (RRI) agendas promoted by the European Commission.

A distinctive contribution of the L-STEAM approach is the integration of **performing arts as a catalyst for learning and engagement**. This not only enhances students' understanding of scientific concepts but also strengthens communication, empathy, and cultural awareness—competences increasingly recognised in European policy as essential for democratic participation and social cohesion.

Furthermore, the roadmap supports **evidence-based school development and policy implementation** through its structured processes of self-reflection, planning, implementation, and continuous improvement. Tools such as the NEXT STEP/L-STEAM Self-Reflection Tool provide schools and education authorities with mechanisms to monitor progress and support **data-informed decision-making**, which is a key requirement in contemporary education governance.

From a policy perspective, the STEAM IDEAS' Square Roadmap can serve as:

- a **scalable model** for integrating STEAM education within national and regional education strategies,

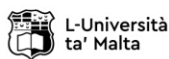


- a **capacity-building framework** for teacher professional development systems, and
- a **bridge between education, research, culture, and society**, supporting cross-sector collaboration.

For teachers and school leaders, the roadmap provides a clear pathway to **translate policy priorities into classroom practice**, enabling them to design meaningful learning experiences that connect scientific inquiry with creativity and real-world challenges.

For policymakers and education authorities, it offers a **validated and adaptable framework** that can support the implementation of European and national strategies on STEM, innovation, and inclusive education.

Ultimately, the L-STEAM approach contributes to a broader vision of education in Europe: one that is **innovative, inclusive, and responsive to societal challenges**. By fostering transdisciplinary learning, strengthening school-community partnerships, and empowering both teachers and learners, the STEAM IDEAS' Square Roadmap supports the development of **future-ready citizens**, capable not only of understanding the world, but of shaping it responsibly and creatively.



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