

Learning STEAM Through Performing Arts

R2.3 The L-STEAM Strategies

20/8/2025

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Short Description	The document describes the recommendations to concrete actions for schools to develop their pathways towards innovative STEAM education. These pathways are the L-STEAM strategies offered to teachers.		

1. Introduction

In an era where education must prepare students for complex, interconnected challenges, schools need more than isolated subject knowledge—they need strategies for fostering creative, adaptable, and interdisciplinary thinkers. The integration of Performing Arts within STEAM education offers a dynamic approach to nurturing these competencies, transforming classrooms into spaces of exploration, collaboration, and innovation. This document presents a strategic procedure that empowers educators to guide their institutions through progressive stages of development—Starter, Enabled, Advanced, and Master—ensuring continuous growth in implementing STEAM through Performing Arts.

1.1. The purpose of the L-STEAM Strategies

The L-STEAM Strategies aim to provide educators and schools with a practical roadmap for embedding performing arts into STEAM education through a competence-based approach. Their purpose is not only to inspire but also to guide schools in systematically cultivating the core competencies—creative thinking, collaboration, technological literacy, and adaptability—so that learners gradually advance from foundational engagement to mastery. In doing so, the Strategies serve as both a framework and a set of actionable guidelines for transforming educational practices.

The L-STEAM Strategies are designed to recommend concrete actions that help schools shape their own pathways toward innovative STEAM education. Rather than offering abstract principles, they provide educators with structured guidance on how to embed performing arts into teaching and learning, cultivating creativity, collaboration, and critical thinking across disciplines. A central strength of these strategies lies in their collaborative foundation: developed through the active involvement of multiple partners, they reflect diverse educational realities across Europe, ensuring broad applicability and adaptability. Moreover, they are conceived as resource-efficient tools, enabling schools to innovate and grow without requiring significant financial investment. In this sense, the Strategies serve as a bridge between vision and practice, supporting schools as they progressively advance along the competence-based framework.

More specifically, the Strategies serve four interconnected purposes:

- **Collaborative design:** Developed through the contributions of multiple partners, they capture diverse perspectives and experiences from a wide range of educational contexts. This ensures that the recommendations remain relevant and adaptable across different European school systems.
- **Performing arts as a catalyst:** By situating scientific inquiry within expressive, narrative, and embodied practices, the Strategies open new possibilities for student engagement. Theatre, music, dance, and storytelling become tools to foster interdisciplinary exploration and deeper learning.
- **Resource efficiency:** The recommendations are conceived to minimize financial burden. Schools can adopt them without significant investments, making innovation accessible even to institutions with limited resources.



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- **Progressive pathways:** The Strategies are not static instructions but dynamic trajectories. They allow schools to evolve gradually—from early experimentation (Starter) to full integration and leadership (Master)—ensuring that each institution can progress at its own pace.

By outlining their purpose in concrete and collaborative terms, the L-STEAM Strategies establish a clear foundation for schools to embark on meaningful transformations in STEAM education. Yet purpose alone is not enough; to ensure real impact, these strategies must be anchored in a systematic process of competency-based progression. This progression framework enables schools not only to adopt innovative practices but also to measure, reflect on, and strengthen the competencies they nurture in students and educators. In this way, the move from intent to sustained educational change becomes both structured and achievable.

1.2. The role of competency-based progression

Competency-based progression plays a central role in ensuring that innovative approaches in STEAM education move beyond isolated practices and evolve into long-term institutional transformation. By offering a structured framework of gradual advancement, schools can clearly situate themselves within a developmental pathway, acknowledging both their current strengths and the areas that require growth. This approach fosters a culture of reflection and accountability, allowing educators and stakeholders to see progress as a dynamic journey rather than a fixed outcome. At the same time this process creates a reliable basis for self-assessment, enabling schools to identify their positioning and track their evolution in a transparent and evidence-based way.

Within the L-STEAM framework, this progression is articulated through four distinct levels: Starter, Enabled, Advanced, and Master. Each stage not only marks a greater sophistication in STEAM practices but also nurtures reflective practices that enhance critical self-reflection and shared dialogue among educators. At the same time, the framework provides guidance toward growth, offering schools and teachers clear strategies and resources for scaling up their initiatives in a manageable way. Finally, by embedding these developmental stages into practice, schools strengthen their capacity to align with European STEAM priorities, ensuring that local innovation contributes to broader policy goals while remaining sustainable and inclusive.

2. Overview of the Competence Progression Framework

Building meaningful STEAM education through the Performing Arts requires a clear roadmap for growth. The Competence Progression Framework provides this structure, defining four stages—Starter, Enabled, Advanced, and Master—that guide schools from initial exploration to full integration of Performing Arts into STEAM practices. Beyond mere categorization, this framework functions as a reflective tool, helping educators assess their current position, identify gaps, and plan targeted improvements. It also emphasizes transformation as a



journey: moving from early inspiration to a fully embedded, institution-wide culture of competence-based STEAM education.

2.1. The Four Progression Levels: **STARTER, ENABLED, ADVANCED, MASTER**

The four progression levels—**Starter, Enabled, Advanced, and Master**—offer schools a structured pathway for embedding STEAM education through the performing arts. Rather than prescribing a rigid sequence of steps, the framework allows schools to situate themselves realistically, acknowledging both their existing strengths and the areas where they aspire to grow. In this sense, the levels serve as developmental milestones that encourage gradual, sustainable change.

The core STEAM competences—from creative and critical thinking to adaptability and resilience—were described in [R2.2 The L-STEAM Competence based Framework](#) as follows:

- Creative and Critical Thinking in Performing Arts
- Interdisciplinary Knowledge Through the Arts
- Cooperation and Communication in Performing Arts
- Technological Literacy in the Performing Arts
- Research and Exploration Skills Through the Arts
- Artistic and Creative Expression in STEAM
- Adaptability and Resilience Through Performance

The above competences are not tied to a single level but form a holistic spectrum that schools progressively embrace. A school at the Starter level may focus on cultivating just one or two competences, such as basic cooperation and creative expression, while gradually exploring others as it moves forward. At the Advanced stage, more sophisticated integration becomes visible, where multiple competences interact across projects and disciplines. Reaching the Master level implies that a school has developed a balanced profile across all competences, demonstrating consistent, systemic integration of performing arts into its STEAM practices.

This progression is guided by a reflective and adaptive approach. Through the self-reflection tool, schools identify which competences are underdeveloped, choose where to focus their energy, and track improvement over time. The framework thus respects diversity in educational contexts: some schools may prioritize technological literacy, while others may begin with interdisciplinary knowledge or artistic expression. Ultimately, advancement across the levels reflects not only the accumulation of competences but also the school's capacity to weave them together into a coherent, innovative, and transformative learning culture.

2.2. Self-Reflection as a tool for improvement and development for Institutions

Assessing the effectiveness of the STEAM IDEAS' Square approach to schools needs an appropriate tool that is sensitive to analyse the key characteristics of these environments (The NEXT STEP Framework (M. Sotiriou et al., 2021). The development of the [NEXT STEP Self-Reflection Tool](#) (that will be the self-reflection tool L-STEAM project will use) was the response to follow the organisational change during the implementation. Based on methodologies for assessing the impact of RRI in education (van Atteveldt et al., 2019; Hobbiss et al., 2019) it analysed the school community engagement in research and innovation. Furthermore, it is supposed to enable easier access to scientific results for students, to take up gender and ethics in the research and innovation content and process, and act as a bridge of formal and informal science education, on the EU recommendations for the science education and on the development of responsible citizenship ([“A STEM Education Strategic Plan” \(2025\)](#), Castek, J. et al (2019), EC, 2015a) as well as to analyse schools' e-maturity (Sotiriou et al., 2016; Kampylis et al., 2015; EC, 2019b). By focusing on three identified areas of 'growth' (Sotiriou, M. et al (2021)) – school management, school process and teachers' professional development– the specific instrument is offering the opportunity to the school community stakeholders to describe in detail the current situation in their school while at the same time they are able to translate the findings to specific recommendation for future actions and development. More specifically the tool aims to support the school heads to identify the status of their school in the following key areas (levels of STEAM integration):

- **Management:** The aim of the instrument is to assess the vision, the leadership of the school community key stakeholders towards the adoption of a change culture towards openness and STEAM education (Earley, & Greany, 2017; Hobbiss et al. 2019) and the overall innovation potential of the school community (George, & Desmidt, 2018) and to highlight the appearance (or not) of the key factors that can catalyse the cultural changes (e.g. coherence of local or national policies, development of a shared vision and understanding, development of motivation mechanisms and specific plans for staff competences, school autonomy). This section of the instrument includes a step-by-step approach for the school heads to define a root of development and to locate the current position of their school in the STEAM innovation journey.
- **Process:** The aim of this section is to identify which processes are already in place in the school community and which must be further developed. The instrument is sensitive in highlighting the processes and the mechanisms like a) the operation of collaborative environments and tools (for content co-creation and sharing), b) how many members of the school community are using them regularly, c) adjustments with the curriculum that allow for the implementation of STEAM school activities, d) parents and external stakeholders' involvement in the STEAM school activities and e) procedures in place that are offering opportunities to reflect and debate, communication and feedback mechanisms).

- **Teachers' Professional Development:** The aim of this section of the instrument is to assess to what extent teachers and school staff engaged in the STEAM IDEAS' Square approach, have a holistic view of science, scientific research and major scientific developments (Harris & Tassell, 2005; Sotiriou et al., 2016). This section includes reflections on the integration of STEAM principles into school curricula and teaching practices. These reflections and evaluation of curricula and practices are supposed to reveal changes in awareness/knowledge aspects/behaviour in relation to the STEAM principles and school openness— such as gender, ethics, open access, open science, public engagement, governance, socio-economic development and sustainability, social issues related to scientific developments. Supporting teacher leadership may play an essential role to empower reaching this target (Muijs & Harris, 2003).

2.3. From Inspiration to Institutional Transformation

From the first sparks of creative experimentation, schools can progress toward deep, systemic change where STEAM competencies developed through performing arts become a defining element of their institutional identity. This transformation requires moving beyond isolated projects to establish sustainable, whole-school practices that integrate creativity, collaboration, and innovation into everyday learning. Recent research highlights that STEAM pedagogies enriched by arts integration drive not only interdisciplinary learning but also structural reform. For example, Sánchez Milara and Cortés Orduña (2024) argue that meaningful STEAM transformation demands curriculum redesign and rethinking teacher preparation to break down subject silos and promote authentic, student-centred inquiry. At the same time, arts-based approaches play a crucial role in advancing equity and inclusion. Silverman et al. (2025) show that creative, arts-infused astronomy programmes significantly increased girls' engagement in middle school and strengthened their science identity, especially among underrepresented groups. The integration of such practices into school culture can support a pedagogical but also social and inclusive transformation, cultivating communities of learners who see STEAM as relevant, empowering, and inspiring. Over time, these practices consolidate into an institutional ethos where creativity, adaptability, and inclusion are embedded at the core of educational practice rather than remaining peripheral.

3. Strategy Matrix: From STARTER to MASTER

Progression toward mastery in STEAM through Performing Arts requires intentional strategies that align competencies with each stage of development. The Strategy Matrix translates the framework into actionable steps, offering competence-based activities, tailored resources, and reflective evaluation tools for every level of progression. It also underscores the need for inclusive and culturally responsive approaches, ensuring that all students can engage meaningfully regardless of background or ability. This section equips



educators with a practical roadmap, empowering them to design, implement, and refine initiatives that lead their schools from foundational engagement to institutional excellence.

3.1. STEAM for Beginners – Strategies for STARTER Schools

3.1.1 Introduction

Schools in the STARTER category are at the beginning of their STEAM journey. They are planning to integrate STEAM approaches but have not yet implemented substantial interdisciplinary or performing arts-related activities. This stage is crucial for cultivating awareness, preparing staff, and designing early-stage interventions.

The L-STEAM strategy for STARTER schools focuses on building foundational structures: capacity-building, awareness-raising, curriculum review, and small-scale interdisciplinary experiments—anchored in the Performing Arts to inspire engagement and creative learning.

3.1.2 Strategic Objectives

- **Build Awareness:** Introduce the school community to the concept and value of STEAM through the Performing Arts.
- **Identify Needs:** Conduct baseline assessments and gap analyses on STEAM knowledge, infrastructure, and teacher readiness.
- **Empower Teachers:** Launch introductory CPD on interdisciplinary teaching and arts integration.
- **Pilot Activities:** Design small STEAM learning experiences, particularly through theatre, music, and movement.

3.1.3 Key Actions

3.1.3.1 Needs Analysis and Capacity Mapping

- Implement a diagnostic tool to assess school needs in CPD, infrastructure, and interdisciplinary collaboration.
- Identify teacher champions willing to engage with new pedagogies.

3.1.3.2 Teacher Training and Professional Development

- Offer foundational CPD modules on:
 - Creative and Critical Thinking in Performing Arts
 - Introduction to STEAM education
 - Basic tools for digital storytelling and stage design

3.1.3.3 Pilot Projects through the Arts

- Design short-term interdisciplinary projects that involve performing arts:
 - Example: Use a simple shadow theatre production to explore scientific themes (e.g., phases of the moon, plant growth).
 - Combine mathematics with movement and rhythm in dance.

3.1.3.4 Peer Learning and Networking

- Connect with other STARTER schools via the L-STEAM platform.

Competency Domain	Suggested Entry-Level Activities
Creative Thinking	Role-play scientific processes; storytelling to explore environmental issues.
Interdisciplinary Knowledge	Combine music with science (e.g., exploring sound waves through musical instruments).
Communication	Perform short plays on STEM themes; use drama to develop public speaking.
Technology	Use basic audio-visual tools to record performances or create digital posters.
Research Skills	Explore local cultural traditions and link them with environmental or social science themes.
Artistic Expression	Compose short songs or perform dances that reflect mathematical or physical concepts.
Resilience	Reflect on rehearsal processes; use feedback from peers to improve.

At this stage, progress should be monitored through:

- Reflective teacher journals
- Student feedback on pilot activities
- A CPD tracker
- Participation in local L-STEAM workshops and webinars

- Complete at least 1–2 integrated STEAM-Performing Arts projects
- Build a small team of 2–4 trained STEAM advocates
- Document early good practices to share with other STARTER schools

3.2.1 Introduction



ENABLED schools have already begun integrating STEAM through isolated or early-stage collaborative projects. They have initiated interdisciplinary collaboration but often lack systemic planning, external engagement, and deeper connections between STEAM disciplines and the arts.

The L-STEAM strategy for ENABLED schools is to **build momentum**, **deepen interdisciplinary practices**, and **encourage connections** beyond the school through the Performing Arts. At this level, schools should begin accelerating their transition toward more structured and ambitious STEAM actions.

3.2.2 Strategic Objectives

- **Structure Collaboration:** Encourage systematic interdisciplinary teaching through co-planning and co-teaching, especially between arts and STEM teachers.
- **Enhance Capacity:** Deepen teacher competencies and confidence with more advanced CPD in arts-based STEAM.
- **Engage Community Resources:** Connect with cultural institutions, artists, and local STEM professionals.
- **Design Integrated Curricula:** Begin mapping STEAM themes across subjects with performing arts as a unifying tool.

3.2.3 Key Actions

3.2.3.1 Collaborative Planning and Teaching

- Create **STEAM Teaching Teams** that pair science/maths teachers with arts educators.
- Pilot co-designed units or school-wide STEAM weeks centered around performance (e.g., musical theatre on environmental sustainability).

3.2.3.4 Thematic STEAM Projects

- Launch school projects focused on real-world problems (e.g., climate change) and presented through drama, song, or interactive exhibitions.
- Encourage the use of **design thinking** in artistic problem-solving.

3.2.3.5 Community and Cultural Engagement

- Invite **local performers, theatre directors, or scientists** to mentor students in collaborative STEAM productions.

- Provide training in:
 - Interdisciplinary lesson design
 - Stage technology and digital scenography
 - Performing arts as assessment tools in STEAM

Competency Domain	Suggested Developing-Level Activities
Creative Thinking	Scriptwriting based on science or future innovation scenarios.
Interdisciplinary Knowledge	Use of puppetry or musical theatre to explore engineering structures or environmental systems.
Communication	Develop student-led performances for peers/parents on scientific discoveries.
Technology	Use green screen, lighting, and sound engineering tools in stage design.
Research Skills	Student research on historical art-science figures (e.g., Da Vinci) and performative interpretations.
Artistic Expression	Choreographing movement patterns that visualize mathematical formulas or physics principles.
Resilience	Students reflect on feedback cycles during rehearsals and peer reviews.

- Documenting lesson plans and teacher reflections
- Collecting videos or photos from performances
- Gathering audience and peer feedback after performances

- Create at least 3 interdisciplinary arts-based STEAM learning modules
- Host one major public-facing STEAM-PA event
- Establish formal links with one external cultural or STEM partner

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3.3.1 Introduction

Schools in the **ADVANCED** category have implemented STEAM approaches through project-based learning, digital tools, and community partnerships. These schools now face the challenge of moving from **successful implementation** to **sustainable transformation**.

The L-STEAM strategy here focuses on helping schools **reimagine their future role** by embedding innovation deeper into their culture through the Performing Arts. Performing Arts become a medium for transformation—allowing experimentation, cultural integration, and community engagement to flourish.

3.3.2 Strategic Objectives

- **Expand Project-Based Learning:** Use Performing Arts to link large-scale interdisciplinary projects with local/global issues.
- **Foster Future-Oriented Learning:** Apply future classroom concepts and design-thinking in STEAM scenarios.
- **Promote Leadership in Innovation:** Empower educators to lead systemic change and act as mentors for other schools.
- **Embrace Open Schooling:** Position the school as a learning hub for the wider community.

3.3.3 Key Actions

3.3.3.1 STEAM IDEAS' Square Initiatives

- Launch whole-school projects combining **Innovation, Design, Engineering, Art, and Sustainability** (IDEAS) using:
 - Storytelling festivals with science themes
 - STEAM hackathons on social issues
 - Interactive performances with digital technology (e.g., motion capture, projection mapping)

3.3.3.2 Teacher Innovation Labs

- Form internal labs where teachers co-create STEAM-PA learning tools.
- Host peer-observation sessions and pedagogical experimentations.

3.3.3.3 Student-Led Explorations

- Empower students to design and lead projects, e.g.:

- A musical exploring AI ethics
- Dance-based interpretations of physics phenomena

3.3.3.4 Sustainability and Resilience Focus

- Emphasize performance-based assessment of real-world challenges (e.g., dramatizing sustainable living scenarios).
- Integrate reflection, emotional literacy, and resilience as key outcomes in performing arts STEAM units.

3.3.4 Alignment with STEAM Competencies through Performing Arts

Competency Domain	Suggested Advanced-Level Activities
Creative Thinking	Stage performances co-designed by students using iterative design methods.
Interdisciplinary Knowledge	Develop thematic school-wide STEAM-PA productions (e.g., "The Climate Opera").
Communication	Launch TED-style student talks with performative elements (poetry, monologue).
Technology	Experiment with AI-generated stage elements or VR-enhanced performance spaces.
Research Skills	Student research papers presented through dramatic performance or music.
Artistic Expression	Cross-cultural fusions in music, theatre, or dance to reflect global issues.
Resilience	Showcase "failure-to-success" journeys through reflective artistic expression.

3.3.5 Monitoring Progress and Next Steps

Measure progress through:

- Portfolios of student work with integrated performance, design, and scientific elements
- Educator innovation logs
- School-wide showcases and feedback sessions with external evaluators

Targets include:

- At least one full-school STEAM+Performing Arts interdisciplinary unit per term



- 2–3 teacher-led innovation labs annually
- Mentoring of ENABLED schools in the L-STEAM network

3.4. From Innovative Schools to STEAM-Enriched Learning Ecosystems – Strategies for MASTER Schools

3.4.1 Introduction

MASTER schools represent the highest level of STEAM integration. These schools not only implement STEAM approaches as routine practice but also lead the way in innovation, teacher collaboration, and external engagement. Their role extends beyond internal transformation—they are **hubs of educational excellence and cultural change**.

The L-STEAM strategy for MASTER schools is to support them in evolving from innovative institutions to **ecosystems of STEAM-enriched learning**. Performing Arts play a vital role in this evolution—offering schools powerful means to connect learning, community, and culture.

3.4.2 Strategic Objectives

- **Systematize Innovation:** Embed STEAM and arts-based pedagogies into the school's long-term strategy.
- **Lead by Example:** Act as mentors and training centers for other schools.
- **Foster Ecosystemic Thinking:** Develop partnerships that transform the school into a **learning ecosystem** involving families, artists, scientists, and local authorities.
- **Contribute to Policy and Research:** Share models, tools, and results through national and EU networks.

3.4.3 Key Actions

3.4.3.1 Institutionalizing STEAM & Arts Integration

- Integrate STEAM-Performing Arts goals into the **school development plan**.
- Allocate time and resources for **cross-disciplinary planning** and **joint assessment models**.

3.4.3.2 Mentorship and Peer Learning

- Design structured **mentorship programs** for STARTER and ENABLED schools.
- Host **L-STEAM labs**, demonstration days, and CPD workshops for external visitors.



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3.4.3.3 Building Sustainable Partnerships

- Formalize partnerships with:
 - Local theatres, orchestras, or cultural centers
 - Universities and STEAM research institutes
 - Civil society organizations and local government

3.4.3.4 Policy Impact and Dissemination

- Contribute to **white papers**, policy briefings, and national education consultations.
- Co-develop resources, case studies, and toolkits with the L-STEAM consortium.

3.4.4 Alignment with STEAM Competencies through Performing Arts

Competency Domain	Suggested Master-Level Activities
Creative Thinking	Co-creation festivals with community actors, youth, and teachers.
Interdisciplinary Knowledge	Develop modular curricula that embed STEAM+PA into every school subject.
Communication	Produce documentary-style performance pieces for policy audiences.
Technology	Launch school-run digital platforms for showcasing arts-based STEAM learning.
Research Skills	Collaborate with academic researchers on evaluation of artistic STEAM methods.
Artistic Expression	Develop student-led productions for national/international performance.
Resilience	Create reflective portfolios to track learning growth and emotional development.

3.4.5 Monitoring Progress and Legacy Actions

Indicators of maturity include:

- Recognition at national/EU level as an innovation leader
- Formalized strategic partnerships
- Published reports, case studies, or models

Long-term goals:

- Sustain a **STEAM-Performing Arts Innovation Unit** within the school
- Create a **school alumni network** that links arts, STEM, and civic engagement
- Serve as a **policy advocate** for the role of arts in STEM education

4. Supporting Educators and Schools - Conclusion

The L-STEAM Strategies provide a practical and adaptable framework that supports schools and educators in integrating Performing Arts into STEAM education in a structured and sustainable way. By combining a competence-based progression model with concrete actions, the framework enables schools to move gradually from initial experimentation to systemic implementation, aligned with European education priorities.

Central to this approach is the role of educators. Teachers are key agents of change, and their professional development is essential for successful STEAM integration. Through targeted training, peer collaboration, mentoring, and reflective practices, educators are supported in developing the skills needed to implement transdisciplinary, inquiry-based, and creative learning approaches.

At the institutional level, the framework encourages schools to evolve into learning organisations (Senge, P. et al., 2012) where innovation is embedded in everyday practice. The progression from STARTER to MASTER supports schools in planning their development strategically, while tools such as self-reflection enable continuous improvement across leadership, processes, and teaching practices.

The integration of Performing Arts enhances STEAM education by making learning more engaging, inclusive, and meaningful. It supports the development of key competences such as creativity, collaboration, communication, and resilience, while also helping to reach diverse learners and promote equity.

The Strategies also promote collaboration beyond the school, encouraging partnerships with cultural organisations, research institutions, and local communities. At higher levels, schools contribute to wider educational ecosystems, supporting peer learning, innovation, and policy development.

Designed to be resource-efficient and flexible, the L-STEAM Strategies can be implemented across diverse school contexts. Overall, they offer a coherent pathway for strengthening educational quality and fostering innovative, inclusive, and future-oriented learning environments.

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