



STEAM BO.SS

boosting soft skills

Evaluation with VET system

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Sapere utile



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1. Introduction

The STEAM BO.SS (STEAM Boosting Soft Skills) project represents a strategic European initiative designed to bridge the gap between technical vocational training and the multi-dimensional demands of the 21st-century labor market. This global report synthesizes the findings from four national evaluations conducted in Estonia, Spain, Portugal, and Italy, providing a comprehensive overview of how the project's pedagogical interventions have influenced the Vocational Education and Training (VET) ecosystem.

The primary objective of this transnational synthesis is to evaluate the efficacy of the STEAM (Science, Technology, Engineering, Arts, and Mathematics) methodology in fostering transversal competencies among students. By consolidating data from diverse European educational contexts, this report identifies common trends, localized challenges, and scalable best practices that contribute to the modernization of VET curricula. The evaluation focuses on four key pillars: the evolution of the teacher/trainer profile, the practical implementation of STEAM-based activities, the strategic integration of soft skills, and the impact of cross-sectoral collaboration with the industrial sector.

Methodologically, the findings are derived from qualitative and quantitative feedback collected from educators who participated in the various project's training initiatives.

In an era characterized by rapid technological shifts and the rise of Industry 4.0, it is imperative to understand how VET institutions can transition from traditional, siloed teaching models to integrated, problem-based learning environments.

This compendium serves as a critical monitoring and evaluation tool for the partnership, ensuring that the project's outcomes are aligned with the European Commission's priorities for digital transformation, social inclusion, and pedagogical innovation. By analyzing the feedback from a multidisciplinary group of educators—ranging from robotics and engineering to marketing and languages—this report offers a robust evidence base for future strategic recommendations and policy-making within the European Education Area.

2. Teacher/Trainer Profile

The educators involved in the STEAM BO.SS project across the four partner countries represent a highly experienced and multidisciplinary cohort. In Spain and Portugal, the surveyed professionals typically possess between 6 and 25 years of experience, reflecting a solid career path and a deep-seated understanding of the VET landscape. Similarly, the Estonian and Italian respondents represent key regional training centers and VET institutions, ensuring the project's reach into both technical and general upper-secondary settings.

The group is characterized by its professional diversity; participants include experts in Industrial Robotics, Electronic Equipment, Mathematics, and Sciences, as well as Commercial Research and Professional English. This heterogeneity is vital for the STEAM approach, which requires the collaboration of teachers from both technical and creative backgrounds. Overall, the profile is that of a receptive, lifelong learner committed to methodological modernization and pedagogical innovation.

3. STEAM approach implementation

The implementation of the STEAM approach has emerged as a transformative force within the participating VET centers, with approximately 60-70% of teachers and trainers successfully integrating new activities into their curricula following the training. The data indicates that the project has shifted the pedagogical focus toward active methodologies, most notably Project-Based Learning (PBL) and Challenge-Based Learning.

In Spain, the "Emergency Drone Design" activity was highlighted as a flagship example, where students engaged in the full lifecycle of a technical solution—from situational analysis and technical assembly to final presentation—effectively blending engineering with real-world social challenges. Another innovative case involved "Business Model Prototyping," where manipulative materials like LEGO were used to bridge the gap between environmental analysis (Science) and visual storytelling (Art). In Italy, trainers utilized interactive platforms such as Kahoot and immersive role-playing to simplify complex technical concepts, speaking the "language" of younger generations to improve engagement.

Despite these successes, the transition to a fully integrated STEAM model is not without obstacles. A consistent finding across the four reports is the "rigidity of schedules" and the "administrative burden" associated with interdisciplinary planning. Many educators (approx. 40% in some regions) reported that while they found the methodology inspiring, the lack of dedicated time for cross-departmental coordination remains a significant barrier. Furthermore, the "interdisciplinary design" phase—specifically integrating the "Art" component into purely technical subjects like industrial robotics—was identified as one of the most cognitively demanding aspects for trainers.

To address these challenges, the national reports emphasize a high demand for "turnkey" resources. Teachers unanimously requested more practical, field-specific templates and assessment tools that would reduce the time required for lesson preparation. The consensus is that STEAM is not merely a trend but a structural necessity; it allows for a holistic understanding of technology, which is essential for training professionals who can not only operate machines but also redesign industrial processes. Furthermore, the Estonian report noted a significant shift in pedagogical mindset, where STEAM was used to bridge the gap between technology and everyday real-world challenges. The Italian experience reinforced this by showing that direct experiential learning significantly improves students' ability to grasp abstract scientific principles. However, the reports suggest that for STEAM to be sustainable, it must move beyond individual "pilot projects" and be institutionalized within the official study plans of VET centers. This requires a strategic commitment from school management to provide flexible hours for experimentation and collaboration.

4. Soft skills: use and relevance

There is an overwhelming consensus across the four participating countries regarding the critical relevance of soft skills in modern vocational training. Educators no longer view these competencies as peripheral; instead, they are recognized as a "fundamental transversal axis" that determines student employability and long-term professional success.

Following the training, teachers reported a heightened focus on several key competencies:

- **Problem-Solving:** Consistently identified as the most frequently addressed skill across all countries, serving as the core of STEAM-based challenges.
- **Teamwork and Collaboration:** Observed as a direct outcome of PBL activities, where students had to negotiate roles and manage group dynamics.
- **Decision-Making and Time Management:** Particularly relevant in technical environments where students worked under pressure to meet project deadlines.
- **Adaptability and Proactivity:** Skills that are increasingly demanded by companies in the face of changing industrial environments.

The impact on the classroom environment has been "remarkable and positive". In Portugal and Spain, teachers noted a substantial improvement in student autonomy and engagement when soft skills were explicitly integrated into technical tasks. For instance, in Italy, role-playing exercises such as "The Shipwreck" or "River of Lava" were used to demonstrate the concrete value of communication in a work context.

The findings validate the STEAM BO.SS project's premise: that technical training, when balanced with essential human competencies, results in a more resilient and motivated student body. Students show greater motivation when they understand the practical, human utility of what they are learning, leading to better classroom cooperation and reduced drop-out risks. This integration effectively bridges the gap between being a technical operator and becoming a versatile professional capable of navigating complex labor market demands.

5. Interest and impact of collaboration with companies

A central pillar of the STEAM BOSS project is the enhancement of the relationship between VET providers and the business sector. The national reports indicate a "notable growth" in interest regarding such collaborations, though the level of concrete implementation varies.

Currently, most collaborations remain traditional, focusing on internship management and career guidance. However, the project has catalyzed a shift toward more "integrated models" of cooperation. For example:

- **Joint Activity Design:** In Spain and Estonia, companies have begun to participate in the actual design of educational activities, providing real-world insights and technological support.
- **Direct Professional Involvement:** External professionals have been brought into the classroom for technical talks, mentoring workshops, and even to pose "authentic challenges" that students must solve using tools and software found in the industry.
- **Strategic Alliances:** In Italy, companies involved in the pilot projects have already agreed to offer internships and start formal collaborations with the training organizations.

Despite this promising evolution, significant barriers persist. The "administrative burden" and a "lack of agile communication channels" make it difficult for busy VET teachers to coordinate frequent meetings with industry partners. Furthermore, while the intention for collaboration is high, the Portuguese report highlights that actual partnerships are still often informal and localized.

The impact of successful collaboration is profound: it drastically reduces the "skills gap" by ensuring that students are trained according to current industry standards. When students work on real problems posed by local companies, their readiness for the workforce increases exponentially. To sustain this, the reports recommend a "simplification of procedures" to allow for more flexible and strategic alliances that involve companies in the daily life of the training center, rather than just at the conclusion of the academic cycle. This "matchmaking" between education and industry is crucial for creating a dynamic VET ecosystem that is responsive to the needs of Industry 4.0.

6. Conclusions and Recommendations

The synthesis of the four national reports confirms that the STEAM BO.SS project has successfully initiated a meaningful modernization of pedagogical practices across the partner countries. The receptive attitude of educators toward the STEAM approach, combined with the clear benefits observed in student engagement and soft skill development, validates the project's methodological framework.

However, for these innovations to be sustained beyond the project's lifespan, several strategic actions are recommended:

- **Institutionalization of STEAM:** VET centers must move away from isolated experiments toward a structural integration of interdisciplinary practices in their official curricula.
- **Resource Development:** There is an urgent need for the creation of open-access repositories containing "ready-to-use" STEAM challenges, specific to different professional families, to reduce teacher preparation time.
- **Flexible Scheduling:** School managements must allocate specific, non-teaching hours within educators' schedules for cross-departmental planning and collaboration with colleagues from different disciplines (e.g., Robotics and Arts).
- **Structured Industry Partnerships:** Procedures for company involvement in the classroom should be simplified and formalized to transition from occasional visits to strategic, long-term alliances.
- **Focus on Assessment:** While implementation is high, there is a request for more robust tools to assess soft skills and STEAM outcomes, ensuring that learning is measurable and recognized.

In conclusion, while structural barriers such as lack of time and administrative weight remain, the STEAM Bo.SS project has proven to be a valuable catalyst for change. The project has not only equipped teachers with new digital and pedagogical tools but has also fostered a more connected, innovation-oriented VET environment. Future efforts should focus on scaling these successes through continued professional development and the fostering of "Learning Communities" where best practices can be shared transnationally. The long-term sustainability of these results will depend on continued institutional support and a strategic commitment to reducing the gap between education and the evolving industrial reality.