STEAM BOSS

boosting soft skills

Hackathon Detail Programme: STEAM4Sustainability Hack

Hackathon

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1. INTRODUCTION

The document *Hackathon Detail Programme* provides a comprehensive overview of the evaluation hackathon organised within the framework of the STEAM Bo.SS project.
The hackathon was designed not only as a creative learning event but also as a structured activity aligned with the STEAM Bo.SS project objectives.

The activity is implemented within the European project *STEAM Boosting Soft Skills* (approved by the Italian National Agency INAPP, 2023-1-IT01-KA220-VET-000163992), which adopts the STEAM approach—an interdisciplinary educational methodology integrating Science, Technology, Engineering, Arts, and Mathematics to foster the development of transversal competences. In the context of a rapidly evolving labour market, these competences are increasingly recognised as essential for employability, as they support adaptability, collaboration, and problem-solving in complex and dynamic environments. In cooperation with local companies, the project pursues three main objectives: enhancing VET learners' transversal competences, developing STEAM-based pilot activities aligned with labour market needs, and strengthening the alignment of VET trainers' competences with European standards.

The initiative was included in the European programme DigiEduHack (https://digieduhack.com/), one of the most important global initiatives dedicated to innovation in digital education, which annually brings together teams from around the world to develop solutions for the future of learning. Within this framework, the hackathon contributed to an international context of collaboration and exchange, allowing participants to engage with real-world challenges aligned with digital transformation and educational innovation.

Hackathon landing page: https://steamboss.eu/?page_id=716

1.1 What is a hackathon

A hackathon is a time-bound, team-based event in which participants collaborate to design and develop solutions to predefined real-world challenges. As an active learning methodology, it promotes "learning by doing" in a collaborative and problem-oriented environment.
The hackathon format provides an authentic, challenge based learning experience centred on real world problems, often related to sustainability or innovation, and supports the integrated development of both technical and transversal competences, including creativity, communication, teamwork, and critical thinking. In this sense, it represents an effective experiential learning tool within STEAM education, as it enables participants to apply interdisciplinary knowledge in a practical context.

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1.2 Why an evaluation hackathon

Within the STEAM Bo.SS project, the inclusion of a hackathon with evaluation purposes was a deliberate choice. As an intensive and highly collaborative event, the hackathon supports and tests the development of both technical and transversal competences.

Unlike traditional evaluation methods, often focused on individual performance and theoretical knowledge, the hackathon creates an authentic environment in which participants are required to act, interact, and make decisions in real time.

This type of experience makes it possible to observe participants while they are working, rather than focusing solely on the final outcome. In a dynamic setting, characterised by time constraints and complex challenges, spontaneous behaviours and individual approaches to teamwork become visible. As a result, the hackathon enables the identification, analysis, and evaluation of key soft skills, including:

- collaboration and teamwork, through the way participants interact, share ideas, and support each other
- communication skills, visible in interactions, clarity of expression, and the ability to negotiate meanings and strategies
- creativity and innovation, emerging in how challenges are approached and original solutions are proposed
- critical thinking and problem-solving, observable in decisions taken under pressure and in the ability to rapidly analyse situations
- time management and adaptability, reflected in responding to constraints, reorganising priorities, and remaining effective in uncertain conditions

By embedding evaluation within an authentic and challenging activity, the project aims to assess the effectiveness of the STEAM approach in fostering transversal competences, particularly soft skills.

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2. PARTICIPANTS AND STAKEHOLDERS INVOLVED

2.1 Students

The hackathon involved a total of 44 students from the participating countries (Spain, Portugal, Italy, Estonia), organised into small working groups of 5–6 members each.

Each country involved two distinct groups of students: one composed of learners who had previously participated, in phases preceding the hackathon, in STEAM-based pilot activities developed within the project (WP3), consisting of structured training experiences aimed at developing transversal competences, and another composed of learners who had not previously taken part in STEAM initiatives, defined as the "control group".

Participants were not informed of this distinction, and therefore engaged in the activities without awareness of their group classification. This ensured that all participants approached the tasks without bias or preconceived expectations related to their prior experience, allowing for a more reliable observation of behaviours and performance.

This structure made it possible to evaluate and observe whether there were differences in the soft skills demonstrated by students with prior STEAM training compared to those without such experience, providing a comparative perspective on the impact of the STEAM approach.

2.2 Experts

In addition to participants, two types of experts were involved in each country:

- **Technical mentors**
  - Provided guidance on the development of the proposed solutions;
  - Supported participants in structuring their projects and ensuring feasibility.

Technical mentors were introduced to all groups through an initial session in which their competences and areas of specialisation were clearly presented. Following this introduction, they remained available online throughout the entire duration of the hackathon. Each group could contact them at any time to request clarification or feedback on their project.

The continuous, real-time technical support provided by mentors represents one of the key elements of the adopted hackathon model and was consistently maintained in this phase. This approach ensured constant guidance, fostering a more informed, structured, and effective working process.

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2.3 Observers

Observers were responsible for monitoring group dynamics and collaborative processes. They assessed a range of soft skills, specifically: teamwork, creativity, problem-solving, effective communication and time management

The observers, specifically appointed to monitor soft skills, did not have an active support role within the groups. Their function was exclusively observational: they alternated their observations between the two groups (the STEAM intervention group and the control group) within the same country, systematically moving from one group to the other at regular intervals.

This approach enabled the collection of authentic data on participants' behaviours in real collaborative settings, without interfering with the implementation of the activities.

To ensure consistency in the observations made, in the weeks leading up to the hackathon the observers held regular alignment meetings in which they agreed on the indicators to be observed in the different groups. This enabled them to develop structured evaluation grids which they then used during the hackathon to periodically record notes and qualitative observations in relation to the identified indicators.

*For further details, please refer to the *Soft Skills Assessment Report*.

2.4 Jury

The jury was composed of educational representatives, project partners, and external experts.
Its functions included:

- Evaluating the final presentations
- Assessing projects according to predefined criteria
- Selecting the winning team

2.5 Company

Baltic Workboats shipyard (https://bwb.ee/) was involved in the hackathon as partner.
BWB representative role:

- To contribute to the design of the challenge to ensure its practical applicability and alignment with current industry needs.
- To ensure the relevance of the task to real-world professional contexts

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- To provide practical insight into sustainability related needs and expectations
- To present their own awards for best projects

3. THE CHALLENGE: STEAM4Sustainability Hack

The hackathon challenge centred on the theme of sustainability, with a specific focus on marine pollution, one of the most pressing global environmental challenges. Every year, millions of tonnes of plastic and other pollutants enter the oceans, causing serious damage to marine ecosystems, biodiversity, human health and coastal communities.

Against this backdrop, participants were given a concrete mission: to devise innovative and sustainable solutions capable of monitoring and preventing pollution or raising public awareness. The proposals had to be applicable in real-world contexts and useful in supporting schools, local communities, coastal towns and institutions both in identifying instances of pollution and in educating citizens on prevention.

Guided by the mission "*Your ideas can save our oceans*", the initiative aimed to go beyond theoretical exercises, encouraging young people to become agents of change. Through creativity, technology and collaboration, the hackathon promoted the development of high-impact ideas to protect the oceans and strengthen environmental awareness.

The activity pursued several key objectives. First, it aimed to strengthen environmental awareness by deepening students' understanding of marine pollution and its consequences. At the same time, it fostered the development of innovation skills, promoting creative problem-solving and the application of design thinking methodologies. The initiative was grounded in a STEAM approach, integrating science, technology, engineering, arts, and mathematics into a unified learning experience. Collaboration also played a central role, as participants worked in teams to enhance their communication and teamwork competences. Finally, particular emphasis was placed on real-world impact, encouraging the development of practical and potentially implementable solutions.

Each component of the STEAM framework contributed to the learning process in a complementary way. Science supported the understanding of ocean pollution and the interpretation of environmental data, while Technology enabled the use of digital tools and platforms such as Microsoft Teams, Canva, and coding environments. Engineering was applied in the planning, prototyping, and development of solutions. The Arts component fostered creativity, design, storytelling, and effective communication, whereas Mathematics underpinned data collection, analysis, and visualization, ensuring an evidence-based approach to problem-solving.

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4. CHALLENGE MANAGEMENT METHODS

Participants belonging to the same team were physically located in the same venue at the host organisation in their respective countries, in order to facilitate collaboration among group members. However, within each country, the STEAM-trained group and the control group were placed in separate rooms, ensuring a focused working environment free from mutual influence.

The entire hackathon was supported by the online collaborative platform Microsoft Teams, which was used to manage communication, coordination, and resource sharing. The platform enabled structured interaction through dedicated channels (Main Channel for participants, ORG channel for organisers, and JURY channel for the jury), as well as the use of Meetings, Chat, and Files for real-time collaboration and document exchange.

Through this platform, participants also had the possibility to contact technical mentors at any time, whenever guidance or feedback was required, ensuring continuous remote support throughout the activity.

International coordination and communication among stakeholders were additionally facilitated through the same digital environment, ensuring coherence across all participating countries.

5. HACKATHON AGENDA

Below is what was presented to them, including the detailed agenda with the hourly breakdown of the two-day schedule.

The hackathon was organised over two consecutive days and followed a structured programme combining moments of thematic input, collaborative group work, and final evaluation activities. Throughout the event, participants alternated between guided speech sessions delivered by experts and facilitators, and intensive teamwork phases dedicated to the development of their solutions.

The speech sessions were designed to provide participants with thematic insights, methodological guidance, and inspiration related to sustainability, innovation, and effective communication. These inputs supported the teams in structuring their ideas and strengthening the quality of their proposed solutions.

Between these moments of input, participants worked in their teams on the different phases of the challenge, including research, idea generation, concept development, and preparation of their final

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outputs. This iterative process allowed teams to progressively refine their solutions through collaboration and mentor feedback.

The hackathon concluded with a final presentation phase, during which each team pitched its project to a jury panel. This session represented the final evaluation moment of the activity, followed by a structured voting process and the announcement of results.

5.1 Hackathon schedule

Day 1: Monday – Discovery & Design			
Local Time (PT)	**Local Time (IT/ES)**	**Local Time (EE)**	**Activity**
08:00	09:00	10:00	**Kickoff:** Meet your team, learn the challenge, opening of the Teams sessions
08:30	09:30	10:30	**Welcome and introduction:** brief introductions of the teams
09:00	10:00	11:00	**Sustainability:** "Rethinking our relationship with the ocean"
09:05	10:05	11:05	**Start of group work**: research (explore marine pollution facts), brainstorming and defining creative ideas
11:00	12:00	13:00	**Communication speech –** how to communicate your message effectively
Lunch break (suitable time of your choice)			
12:00	13:00	14:00	**Group work:** choose and select best ideas and solutions
14:00	15:00	16:00	**Mentor speech:** inspiration and tips for sustainable innovation; check-in by mentors to assess progress
14:15	15:15	16:15	**Resumption of group work:** prototype sketching, planning and digital design
16:00	17:00	18:00	**Closing Day 1**

Day 2: Tuesday – Build & Shine!			
Local Time (PT)	**Local Time (IT/ES)**	**Local Time (EE)**	**Activity**
08:00	09:00	10:00	**Opening of the Teams sessions**: overview of the day's agenda
08:30	09:30	10:30	**Sprint:** final building push – completing projects and preparing presentations
Lunch break (suitable time of your choice)			
13:30	14:30	15:30	**SHOWTIME:** project submissions and pitch *(each team presents their idea/project – 3 minutes)*
14:30	15:30	16:30	**Jury voting session + participants feedback survey**
15:45	16:45	17:45	**AWARDS:** closing ceremony and final remarks

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6. EVALUATION PHASE

6.1 Final presentation

All groups presented their projects during the afternoon of the second day of the hackathon. Each group was given a 3-minute online pitch session to present their project and responded to clarifying questions from the jury members.

Following all presentations, the jury evaluated the projects. This was followed by the announcement of the winners.

*[*All projects developed during the hackathon are included in the annex of this document.]*

6.2 Evaluation criteria

Projects were assessed based on:

- Innovation and creativity
- Environmental sustainability
- Feasibility of Implementation
- Educational and Awareness Impact
- Clarity and Quality of Presentation
- Quality of Research and Sources

6.3 Final prize

The jury evaluated all projects based on the previously defined evaluation criteria and selected one winning team. The winning project was awarded in recognition of its outstanding innovation, quality of collaboration, and overall solution design.

The winning team was initially selected as one of the finalists in the Experienced category of DigiEduHack 2025. Following this selection, the project was further evaluated at international level and was subsequently officially declared a global winner by the DigiEduHack Team.

This result represents a highly significant recognition of the quality, creativity, and impact of the solution developed during the hackathon. It reflects both the strong commitment, engagement, and transversal competences demonstrated by the students throughout the entire process, and the effectiveness of the collaborative framework and methodological support provided by the organisers during the activity. The achievement highlights the team's ability to translate the hackathon experience into a concrete, innovative, and well-structured solution aligned with the objectives of the challenge.

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As part of this recognition, the team received formal acknowledgment and was invited to the official Awarding Ceremony in Brussels, scheduled for 18 June 2026, where winning projects from around the world will be celebrated.

https://digieduhack.com/news/2025-winners

During the evaluation session, both participants and mentors completed the hackathon feedback questionnaires. The results are presented in the document Report on the students' hackathon experience.

7. CONCLUSION AND LESSONS LEARNT

The results of the hackathon consistently indicate that participants involved in the STEAM preparatory activities demonstrated higher performance compared to the control groups, particularly in terms of collaboration, communication, and problem-solving skills. Notably, the winning team belonged to the STEAM-trained group, reinforcing the observed pattern across countries.

Observers' assessments, conducted throughout the activity using structured grids, showed higher average scores for STEAM participants in key transversal competences, including teamwork, creativity, and time management. While detailed quantitative data are presented in the dedicated *Soft Skills Assessment Report*, the evidence collected during the hackathon suggests a clear added value of prior STEAM-based training in enhancing participants' ability to work effectively in collaborative and time-constrained environments.

Beyond performance outcomes, the hackathon confirmed the effectiveness of challenge-based and experiential learning approaches in making transversal competences visible and assessable in real-time contexts. The combination of teamwork, time pressure, and real-world challenges created a dynamic environment in which soft skills could be observed more authentically than in traditional evaluation settings.

7.1 Lessons learned

The implementation of the hackathon also highlighted several key lessons:

- **The importance of prior preparation**: participants with previous exposure to STEAM activities showed greater confidence, autonomy, and effectiveness in managing tasks and collaboration;
- **The value of structured observation**: the use of shared assessment grids enabled systematic and comparable monitoring of soft skills across groups and countries;

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- **The role of real-world challenges**: linking the activity to a concrete and meaningful topic (marine sustainability) increased engagement and the quality of proposed solutions;
- **The relevance of continuous support**: the availability of technical mentors throughout the process contributed to more structured and feasible project development;
- **The effectiveness of hybrid collaboration environments**: the combination of local teamwork and online coordination tools (e.g. Microsoft Teams) proved functional for managing transnational activities.

Overall, the hackathon provided valuable evidence supporting the effectiveness of the STEAM approach in fostering transversal competences. At the same time, it offered practical insights for the design of future learning and evaluation activities based on experiential and collaborative methodologies.

Further analysis of the full dataset will allow a more detailed cross-country comparison and a deeper understanding of the specific competences most influenced by the STEAM intervention.

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