STEAM BOSS

boosting soft skills

Report on the students' and mentors' satisfaction

Hackathon

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1. INTRODUCTION

This report aims to present an evaluation of students' and mentors' experiences in the STEAM4SustainabilityHack, a project-based evaluation Hackaton.

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, transversal 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.

An 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.

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:

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- 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.

This report compiles quantitative and qualitative data provided by both participants and mentors regarding their level of satisfaction with their participation in the hackathon. In particular, the analysis covers aspects such as the clarity of the proposed activity, the relevance and motivational value of the topic addressed, the quality of collaboration with peers and mentors, as well as perceived learning outcomes. The latter relate primarily to the development of teamwork, communication, creativity, programming skills and awareness of sustainability issues.

The objective of this report is to document the overall impact and quality of the Hackathon as an educational intervention and to inform its further refinement in future iterations. The analysis focuses on participants' levels of engagement, and perceived strengths and areas for improvement, drawing on mixed-methods data. The findings provide evidence for project partners and stakeholders interested in replicating or further developing the Hackathon model in comparable educational contexts.

Further details regarding the organisation of the hackathon can be found in the '*Hackathon detail programme'* document.

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2. STEAM4SUSTAINABILITYHACK PARTICIPANTS' FEEDBACK

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.

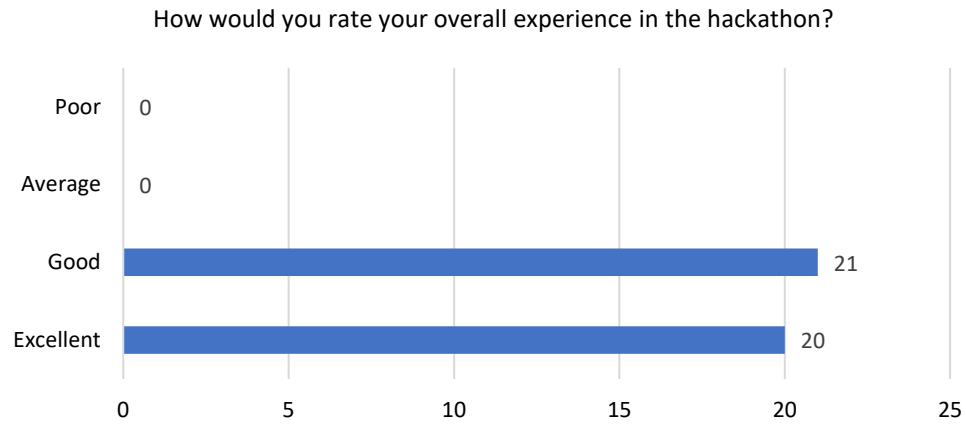
Each country involved two distinct groups of students: one composed of learners who had previously participated, in phases preceding the hackathon, in STEAM-based pilot activities developed within the project (WP3), consisting of structured training experiences aimed at developing transversal competences, 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. For further details on the results of the soft skills assessment, please refer to the '*Soft Skills Assessment Report'*.

You can find the questionnaire used to measure participants' satisfaction at this link: https://forms.gle/xqnwEoa4q92tBi778

Below are the graphs showing the questionnaire questions and their corresponding answers.



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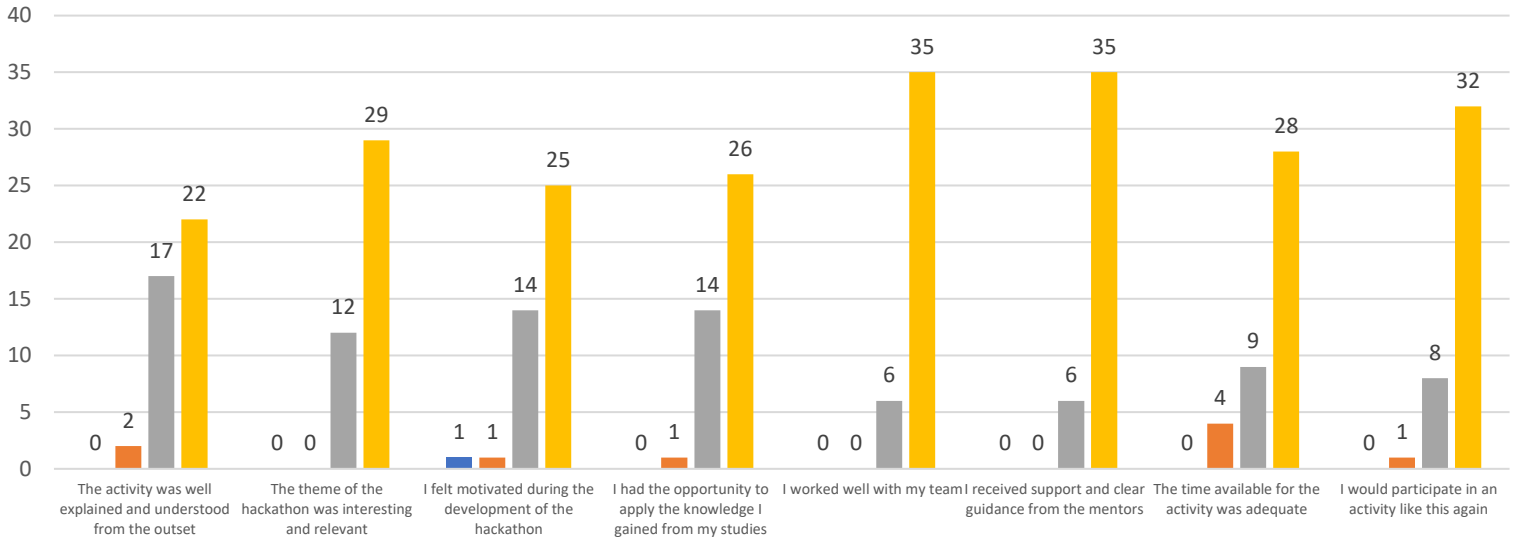
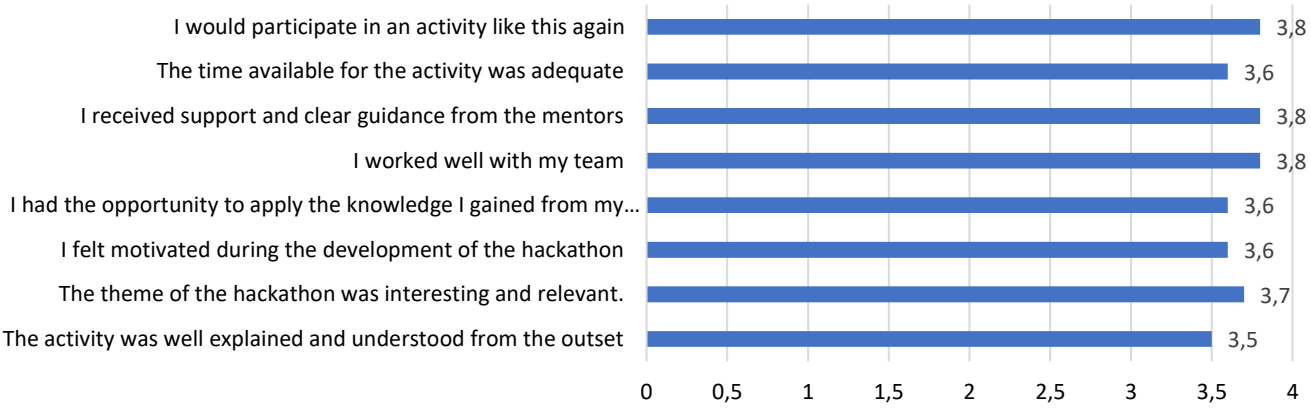
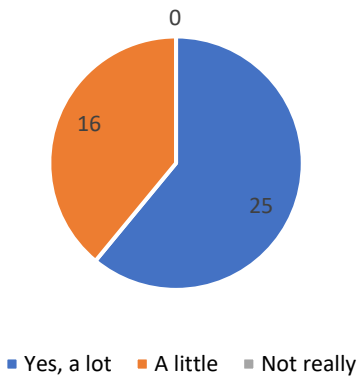
Rate your satisfaction with the hackathon on a scale of 1 to 4, where 1 means "I totally disagree" and 4 means "I totally agree"



Rate your satisfaction with the hackathon on a scale of 1 to 4, where 1 means "I totally disagree" and 4 means "I totally agree" (average per item)



Did this activity increase your awareness and motivation to act for sustainability?



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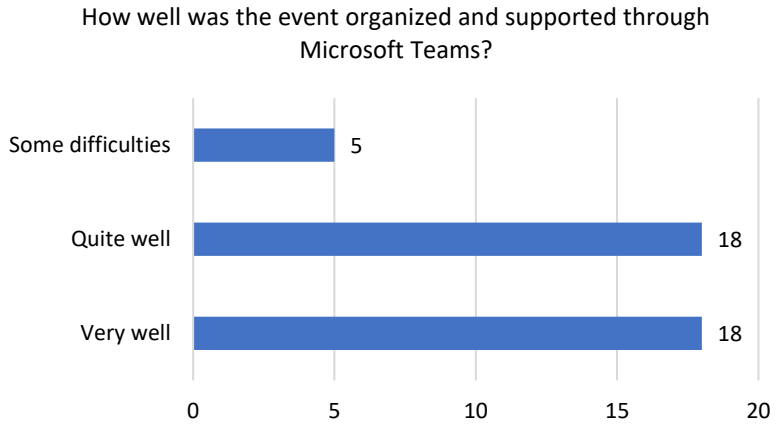

Which skills or knowledge did you improve the most during the hackathon: ** this section quotes personal comments*
• *Coding*
• *Coding, creating presentations, teamwork, English speaking and discipline.*
• *Communication in group.*
• *Creativity and communication*
• *Design and communication skills*
• *During the hackathon, I especially improved my ability to work in a team and solve problems under pressure. I learned to organize myself better. In addition, I strengthened my creativity and my ability to find quick and practical solutions when unexpected situations arose.*
• *Game development, teamwork*
• *Game development and teamwork*
• *How to live more sustainably*
• *I have learned to work under pressure, to be more creative, and to organize teamwork effectively*
• *In programming.*
• *English*
• *Knowing that there are many things we can do to protect the world and the oceans.*
• *Leadership and clear direction about the executive of the project*
• *My art skills*
• *Organization and teamwork*
• *Problem solving and staying calm*
• *Programming skills*
• *Project management*
• *Public speaking*
• *Research, prototype creation, knowledge about sea pollution*
• *Research*
• *Teamwork*
• *Teamwork and creativity*

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• *Teamwork and organizing time*
• *Teamwork, information seeking*
• *The ability to work in a team*
• *To work in team*
• *Workin group and searching interesting information*
• *Workin group, creativity*
• *Workin group, knowledges of the sea*
• *Teamwork, creativity, proactivity*
• *Working in a team*
• *Working in group*

Comments or suggestions for improvement for future activities ** this section quotes personal comments*
• *Give us litle more time*
• *for the moment i don't have comments*
• *I like*
• *I don't have any comments*
• *Don't have*
• *I don't have*
• *More time for the projects*
• *I would like to have more time.*
• *I think it is really good done so nothing to improve*
• *About the internet*
• *No one*
• *Reduction of violence*
• *I like it.*

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3. PARTICIPANTS' FEEDBACK CONCLUSIONS

Student feedback shows high overall satisfaction with the hackathon, strong teamwork and mentor support, meaningful skill development, and a recurring request for more time.

- **Overall evaluation:** Average ratings across key aspects ranged from 3.5 to 3.8 (out of 4), indicating generally positive experiences. The highest-rated items were teamwork, mentor support, and willingness to participate again
- **Engagement and motivation:** Students found the theme interesting and relevant and reported feeling motivated throughout the hackathon, with adequate (though improvable) time allocation.
- **Skills developed:** Most frequently mentioned gains were teamwork, communication, creativity, programming/game development, problem-solving under pressure, project management, and sustainability awareness
- **Suggestions for improvement:** The most common suggestion was to allow more time for project development; many students had no negative comments and expressed overall satisfaction

4. MENTORS' FEEDBACK FOR STEAM4SUSTAINABILITYHACK

A total of 11 mentors from the five participating partners (EDUGEP, IFOA, Unimore, CIPFP Misericordia, Saaremaa Gümnaasium) completed the feedback questionnaire. The respondents included both technical mentors and observers, all of whom were directly involved in the project and had a comprehensive understanding of the overall programme, including the preparatory phases and the hackathon itself.

This dual perspective, combining technical guidance and observational insight, provides a well-rounded and informed interpretation of the hackathon experience. As such, the feedback collected offers valuable qualitative and quantitative insights into both the implementation process and the educational impact of the activity.

The following results should therefore be read in light of this broad and informed perspective, reflecting not only the effectiveness of the hackathon as a standalone event, but also its coherence within the wider STEAM4Sustainability learning pathway.

You can find the questionnaire used to measure mentors' satisfaction at this link:
https://forms.gle/z7aAYs2nx1JXosZY7

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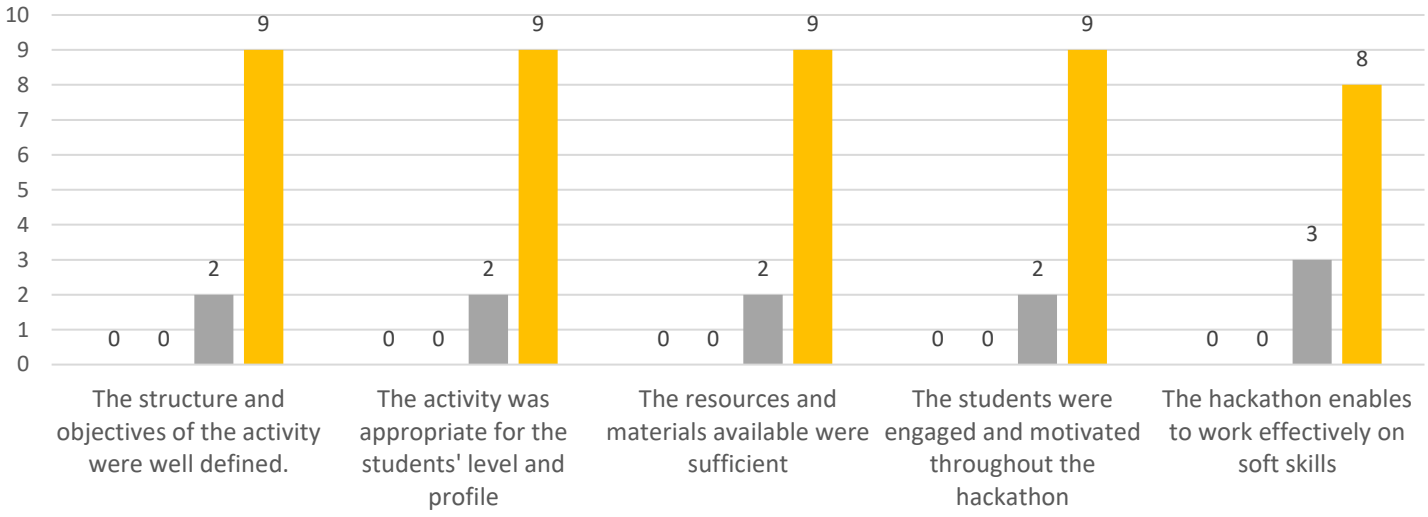
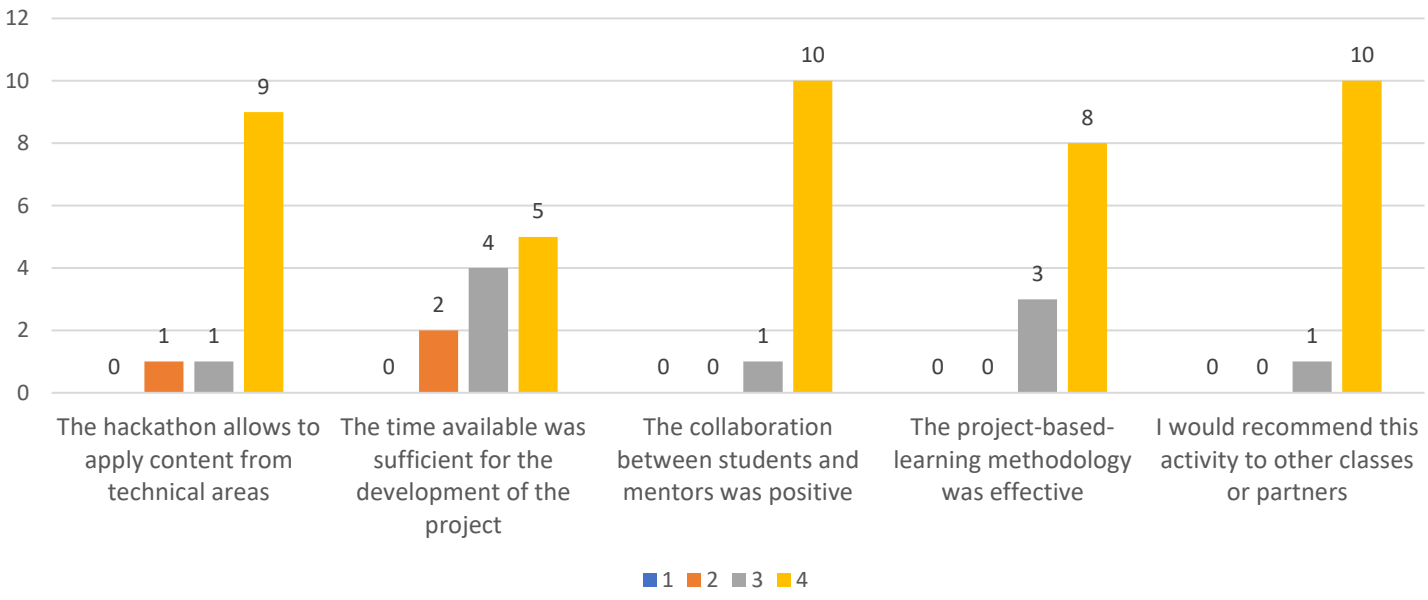
Below are the graphs showing the questionnaire questions and their corresponding answers.

Rate your satisfaction with the activity on a scale of 1 to 4, where 1 means "I totally disagree" and 4 means "I totally agree" (part 1)



Rate your satisfaction with the activity on a scale of 1 to 4, where 1 means "I totally disagree" and 4 means "I totally agree" (part 2)



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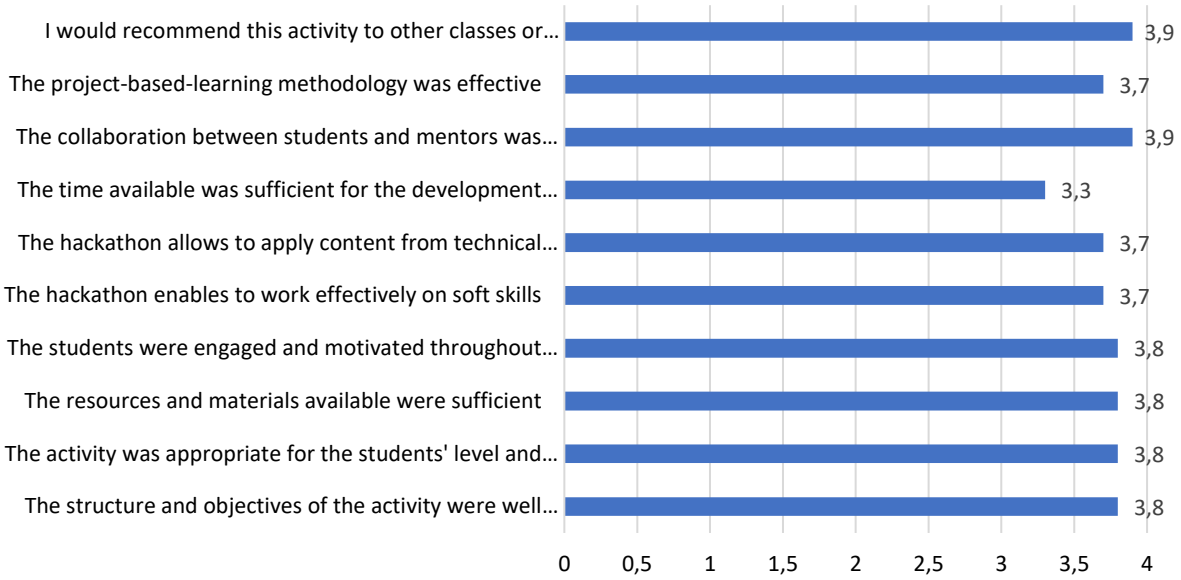
Rate your satisfaction with the activity on a scale of 1 to 4, where 1 means "I totally disagree" and 4 means "I totally agree" (average per item)



*Additional comment: "*The students were really excited about the activity*"

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5. MENTORS' FEEDBACK CONCLUSIONS

Mentors' feedback was very positive, highlighting strong student engagement, effective project-based learning, and excellent collaboration, with limited time as the main weakness.

- **Overall assessment:** Most criteria were rated between 3.7 and 3.9 out of 4, indicating very high satisfaction with the structure, objectives, suitability, and overall quality of the hackathon.
- **Student engagement and collaboration:** Mentors reported high student motivation throughout the activity and particularly strong collaboration between students and mentors, which received the highest scores.
- **Learning outcomes:** The hackathon was considered effective in developing soft skills and enabling students to apply technical and subject-specific knowledge in practice.
- **Areas for improvement:** The only noticeably lower score concerned the time available for project development (3.3), suggesting that a longer duration would improve the experience.
- **Recommendation:** Mentors would strongly recommend this activity to other classes or partners and noted that students were highly enthusiastic about participating.

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6. FINAL CONCLUSION

The results of both participants' and mentors' feedback confirm the effectiveness of the STEAM4SustainabilityHack as an experiential learning activity capable of fostering high levels of engagement, collaboration, and skills development.

Students reported a highly positive experience, highlighting the opportunity to work in teams, develop creative solutions, and apply knowledge in a real-world, challenge-based context. At the same time, mentors emphasised the strong level of motivation and participation observed throughout the activity, as well as the effectiveness of the hackathon format in promoting both technical and transversal competences.

Particular relevance emerges in relation to the development of soft skills, which represent the core focus of the project. The combination of participant feedback, mentor evaluations, and observational data suggests that the hackathon created a dynamic environment in which communication, teamwork, problem-solving, and adaptability could be actively practiced and observed.

Despite the overall positive evaluation, both students and mentors consistently identified time constraints as the main area for improvement, suggesting that extending the duration of the activity could further enhance the quality of outcomes.

In conclusion, the STEAM4SustainabilityHack represents a valuable and replicable model for integrating evaluation and learning within an authentic, collaborative framework. Its alignment with the project objectives and its demonstrated impact on transversal competences highlight its potential for broader application in VET and similar educational contexts.