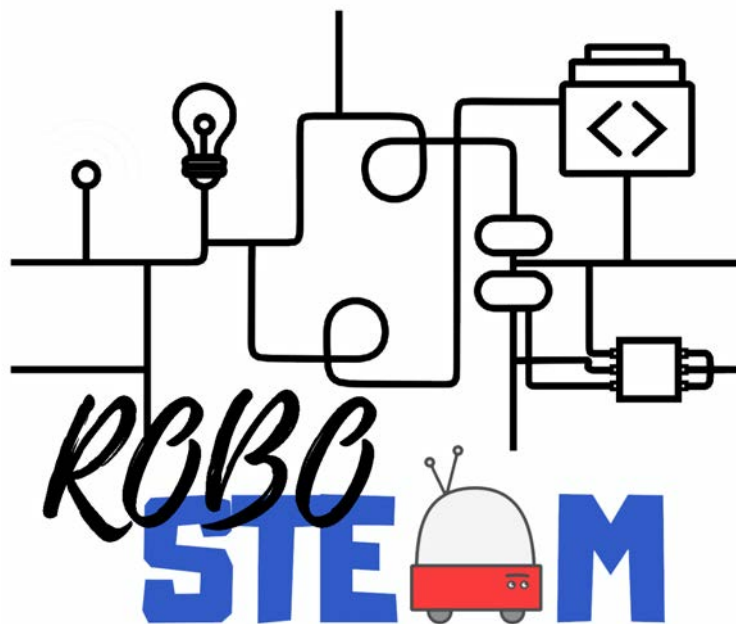

RoboSTEAM Quality Interim Report (M13-24)



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1 INTRODUCTION

The purpose of this report is to document the processes and results of the application of the RoboSTEAM project [1-8] quality assurance plan at month 24 of the project.

1.1 Project Overview

The project aims to experiment with STEAM integration projects that help learners to develop computational thinking by using/programming PD&R in pre-university education environments. To this end, the project proposes the exchange in the European context of experiences related to this topic. This would allow training of in-service and future teachers in such a way that they can apply this knowledge in class. This project will define a set of challenges and tools to address them.

According to the proposal, two pilot cycles have been planned to exchange these challenges and tools between institutions, so to make possible the analysis of the impact of the context where they are used. From the results achieved and the instruments used, good-practice guides should be defined about the development of computational thinking from STEAM integration.

Given this context, the main objective of this project is the definition of a knowledge base to facilitate integrating STEAM and computational thinking by using robots. The plan was to develop and implement pilot programs, gathering good practices and tools, and defining learning actions and educational resources for teachers.

In order to achieve this objective some sub-objectives have been defined:

- Analyse the different existing activities that deal with STEAM integration
- Define some challenges and instruments to facilitate STEAM integration and computational thinking development
- Define metrics to evaluate both the integration and the competence development

- Establish guides for the definition of integration STEAM challenges by using PD&R
- Define educational resources for in-service teachers and future teachers
- Establish ways of collaboration between robotic companies and educational institutions
- Publish the obtained results in order to involve other educational institutions of the same and different contexts

Unfortunately, since March 2020, the work plan suffered a set of changes due to the COVID-19 [9-21] emergency and the impossibility to implement the face-to-face activities originally defined.

The changes affected in particular the following tasks and events:

- A1-A2. Project Management and Quality Assurance. The expected reports during the second project year were produced and the monitorization of the project continued online with the necessary adjustments to the quality plan and the survey tools described in the quality plan update. As it was not possible to travel, the M18 meeting was delayed to M24 and was hold virtually.
- A3. Pilot Phase 1. This phase was completed up to M18 by most of the partners up to 60%. As classes were discontinued it should be finished during the first extension, that is up to the 31st of December. The social distance and the high online workload that the students had require an important effort from them and the teachers.
- A4. Pilot Phase 2. As for A3, by M18 around a 50% of this phase was completed. Also, this activity requires to be delayed in order to be completed and present some problems such as that the students involved in the first pilot not always can participate in the second because they have finished their courses and were not in the institution in the next courses. A5. Dissemination and mainstreaming

have continued both in academic contexts and in social and local media. Although virtual activities were more important in this new context.

Regarding the outcomes:

- O2.A5 – Application of the kits to STEAM challenges in the defined contexts. It was completed up to a 60% in M18.
- O2.A6 – Evaluation of the experiences. Only the pilots in one of the partners institutions was finished before the health emergency, so the activity can be considered completed in a 20% up to this month.
- O3.A4 – Environment maintenance. Changes were made to correct errors and facilitate the connection between the different components, new collections were added (including one related to COVID-19 adapted tools) and updates in the software.

Regarding the multiplier events they have been carried out in the last months of the project, with serious restrictions regarding COVID-19 and social space, this means that to achieve the expected audience the events should be repeated several times in many cases. Regarding students exchanges all except C6 were completed as expected. Specifically, it was possible to complete C2 (during M13), C3 (during M14) and C4 and C5 that take place the same week of the M17.

1.2. Project Team

The ROBOSTEAM project is led by the University of León (Spain) and implemented by 7 further partners:

- Agrupamento de Escolas Emídio Garcia (Portugal)
- CPPCMCM Colégio Internato dos Carvalhos (Portugal)
- IES Eras de Renueva (Spain)
- Instituto Politécnico de Bragança (Portugal)
- Karlsruher Institut Fuer Technolie (Germany)
- University of Eastern Finland (Finland)
- University of Salamanca (Spain)

Partners' roles:

Partner:	Role:
University of León	<ul style="list-style-type: none"> • Project coordinator (management and implementation_A1) • Leader of IO2 • Leader of E2
Agrupamento de Escolas Emídio Garcia (Portugal)	<ul style="list-style-type: none"> • Pilot school_A3 and A4 • Hosting Institution in C3 and C5
CPPCMCM Colégio Internato dos Carvalhos (Portugal)	<ul style="list-style-type: none"> • Pilot school_A3 and A4
IES Eras de Renueva (Spain)	<ul style="list-style-type: none"> • Pilot school_A3 and A4 • Hosting Institution in C2 and C4
Instituto Politécnico de Bragança (Portugal)	<ul style="list-style-type: none"> • Support Research • Leader of E1
Karlsruher Institut fuer Technolie (Germany)	<ul style="list-style-type: none"> • Support Research and Pilot in Carl Benz School • Leader of E5 • Hosting institution in C1
University of Eastern Finland (Finland)	<ul style="list-style-type: none"> • Leader of Dissemination_A5 • Leader of E5 • Hosting Institution in C6
University of Salamanca (Spain)	<ul style="list-style-type: none"> • Leader of Quality Assurance_A2 • Leader of IO3

1.3. Quality Assurance Methodology

According to the Quality Assurance plan, the purposes for managing quality in ROOSTEAM are:

- Monitor the project progress
- Ensure the quality completeness of each activity and output separately and of the whole project
- Ensure the quality of the key processes and the key results of the project
- Identify possible bottlenecks and enable corrective activity

Led by University of Salamanca (USAL), and with the support of all partners, the QA method is using the following tools:

- Evaluation questionnaires for transnational meetings
- Internal monitoring questionnaires
- Evaluation of the outputs and activities

These tools collect the relevant quantitative and qualitative data to measure if Erasmus+ RoboSTEAM is meeting the partnership expectations.

1.4. Project evaluation

The Quality Interim Report is divided into 3 aspects evaluated during the project period according to the key performance indicators defined in the Quality Assurance plan:

- Quality of the Project Management
- Quality of Consortium's engagement
- Quality of the Project implementation

2 PROJECT EVALUATION

2.1. Quality of the Project Management

Project management relates to the quality of project management arrangements, the management and leadership qualities demonstrated by project coordinator, the effectiveness of the process of monitoring and evaluation, the implementation of the work-plan and the integration of project activities into the department's/ institution's development plan.

Quality of the management was measured by the usage of the periodical monitoring questionnaire (M1-12, September 2019 and M13-24, September 2020) and the Transnational Project Meetings questionnaires. The tables below show the responses from the mentioned questionnaires.

Interim Monitoring surveys

Period October 2019 - September 2020 (Tot. 12 responses)

Quality of project management arrangements (Figure 1).

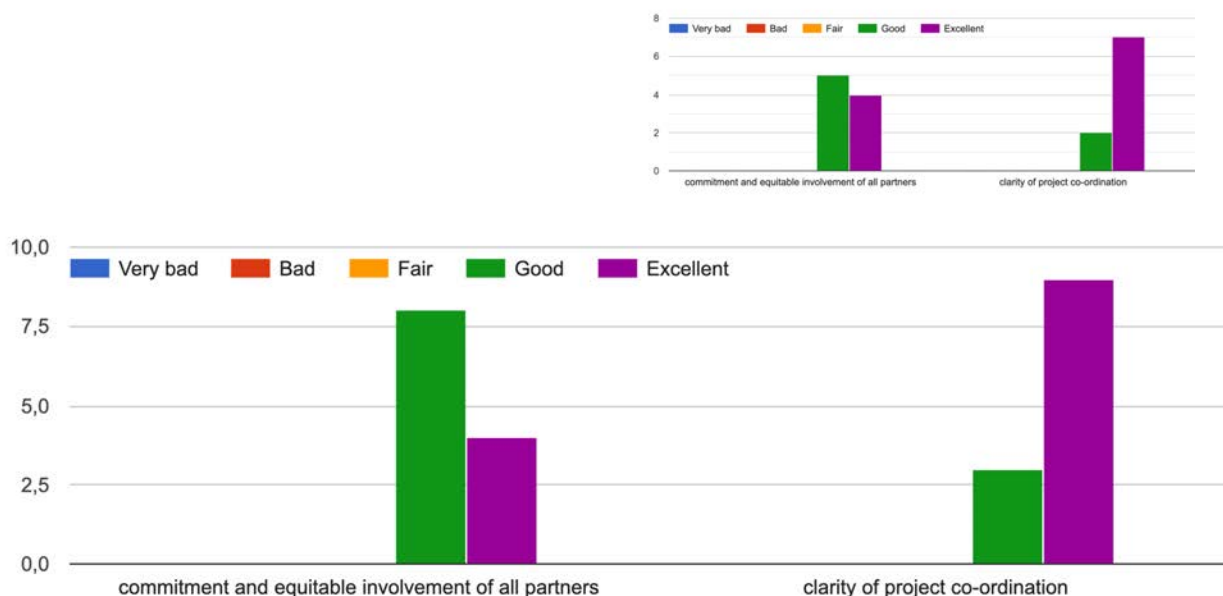


Figure 1. – Results for quality of the project management arrangements – 9 responses (top corner M1-M12) 12 responses (M13-M24)

Leadership qualities of the project coordinator (Figure 2).

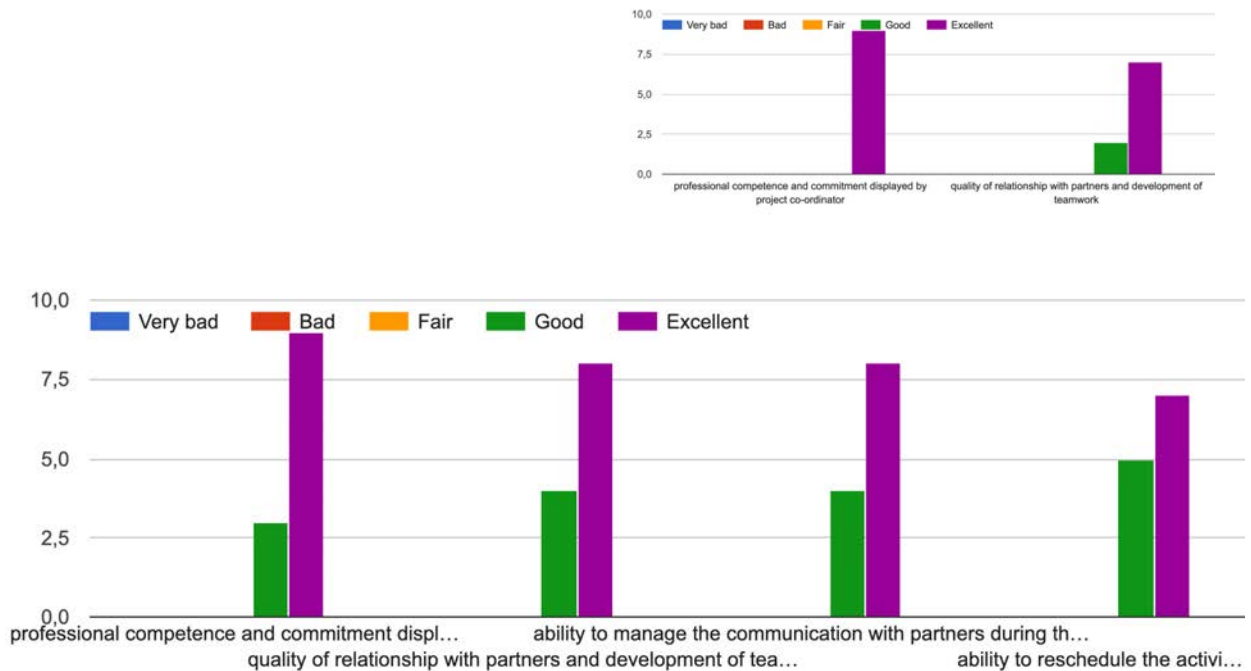


Figure 2. – Results of about Leadership qualities of the project coordinator – 9 responses (M1-M12) and 12 responses (M13- M24)

Topics:

1. Professional competence and commitment displayed by project co-ordinator
2. Quality of relationship with partners and development of teamwork
3. Ability to manage the communication with partners during the COVID-19 emergency
4. Ability to reschedule the activities as consequence of the COVID-19 emergency

The comparison between the two periods confirms the effective management and leadership qualities demonstrated by project co-ordinator.

In particular the partnership recognizes and evaluates in a very positive way the capacity shown by the coordinator in the management of the COVID-19 emergency in terms of maintaining internal communications and rescheduling of activities.

Effectiveness of the process of monitoring and evaluation (Figure 3):

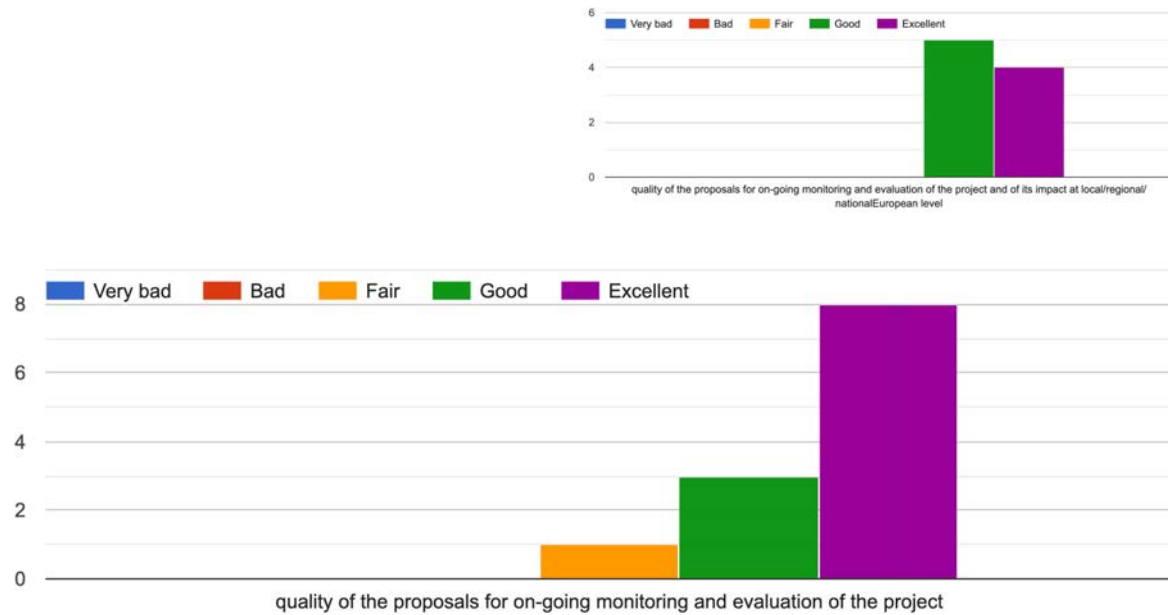


Figure 3. – Results about effectiveness of monitoring and evaluation – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

The project monitoring system worked effectively even during the critical period of the lockdown in which the project activities were necessarily reduced and there were not face to face meetings both at transnational level and locally. In fact, the "excellent" rating has increased significantly in proportion to the responses.

Management, coordination & partnership (Figure 4 and 5 of the previous meetings and 6 of the first virtual transnational meeting).

Tool: Transnational project meetings' evaluation questionnaire.

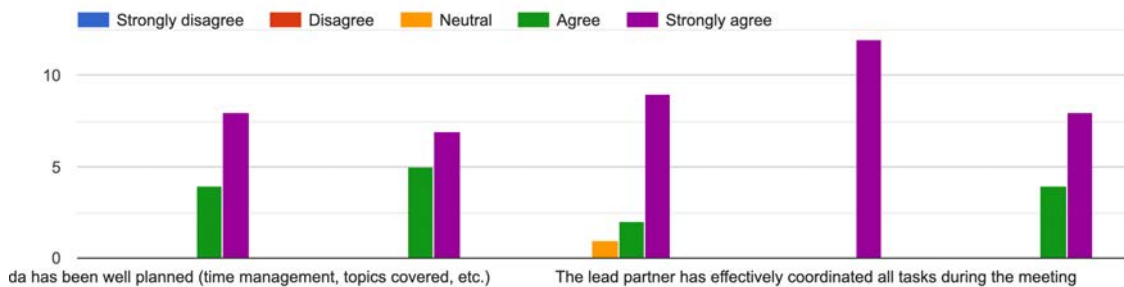


Figure 4 – Results for Bragança (Portugal), 15-16 February 2019 (12 responses)

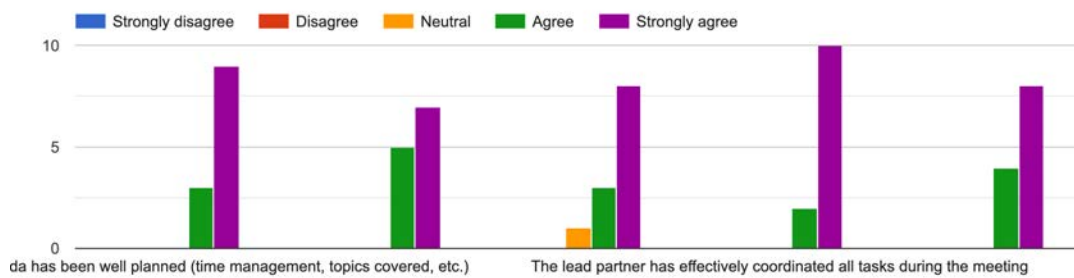


Figure 5. – Results for Karlsruhe (Germany), 30 September - 2 October 2019 (12 responses)

Topics:

1. The meeting agenda has been well planned (time management, topics covered, etc.)
2. The documentation and working materials have been useful and sufficient
3. I feel that all the relevant topics have been sufficiently discussed and cleared
4. The lead partner has effectively coordinated all tasks during the meeting
5. All partners have actively participated and became involved in the project

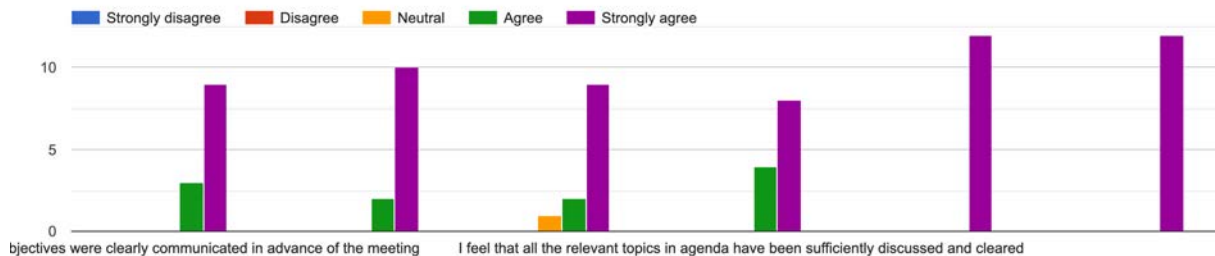


Figure 6. – Results for 28 September 2020 Virtual Transnational Meeting (12 responses)

Topics:

1. The meeting objectives were clearly communicated in advance of the meeting
2. The meeting agenda has been well planned (time management, topics covered, etc.)
3. The documentation and working materials have been useful and sufficient
4. I feel that all the relevant topics in agenda have been sufficiently discussed and cleared
5. The lead partner has effectively moderated all tasks during the meeting
6. Meeting attendees had an opportunity to participate

In spite of the need to adapt the organization of the meeting to the virtual mode, the positive evaluation of the project management by the partnership is confirmed and indeed increased compared to previous surveys.

2.2. Quality of Consortium’s engagement

This section relates to the commitment to the project by each partner, the agreement among partnership, the communication among partners and other actors, the trust among partners, the development of positive attitudes and the atmosphere between partners. Here also we will focus on the quality of support in the partnership.

The Figures below show the total responses collected from the periodical monitoring questionnaire M13-24 and the Virtual Transnational Project Meeting questionnaire M24

Interim Monitoring surveys

Tool: Internal monitoring questionnaire

Period October 2019 - September 2020 (Tot. 12 responses)

Strong commitment to the project by each partner (Figure 7).

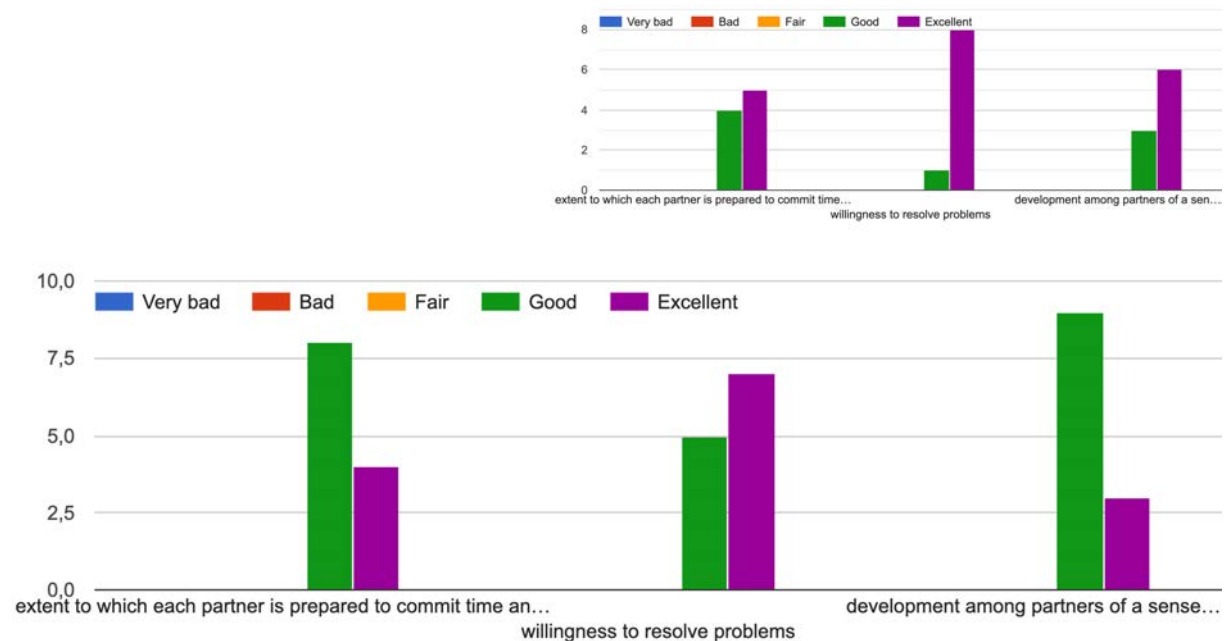


Figure 7. – Results about partner commitment – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Agreement among partners (Figure 8).

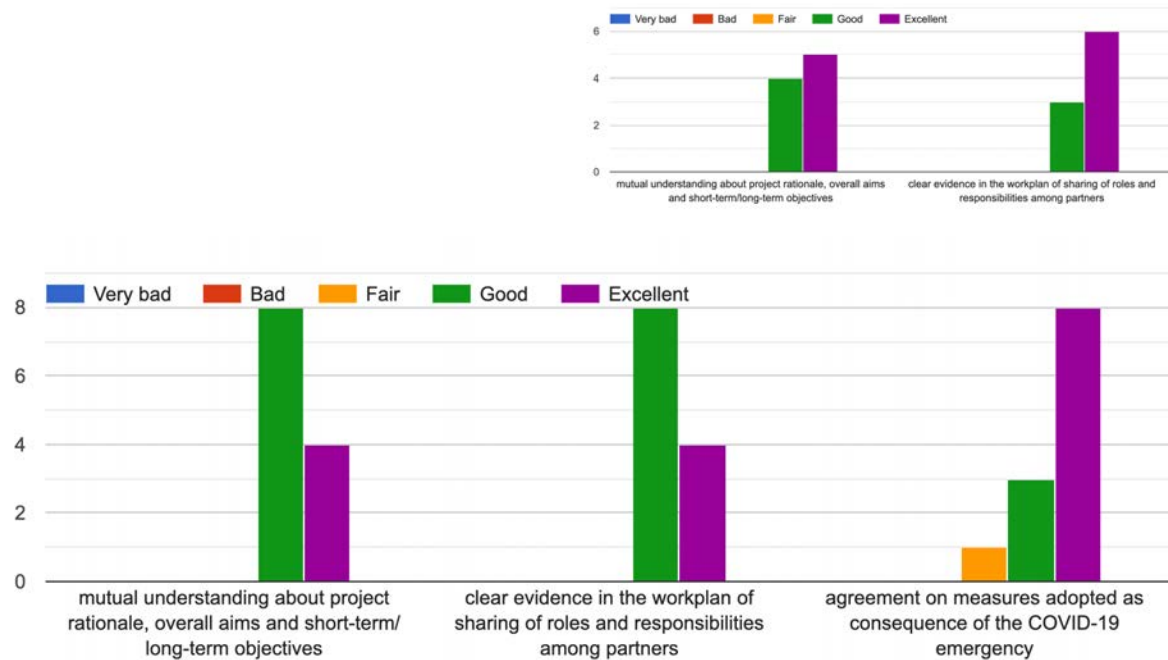


Figure 8. – Results about partner commitment – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Effective and on-going communication among partners (Figure 9).

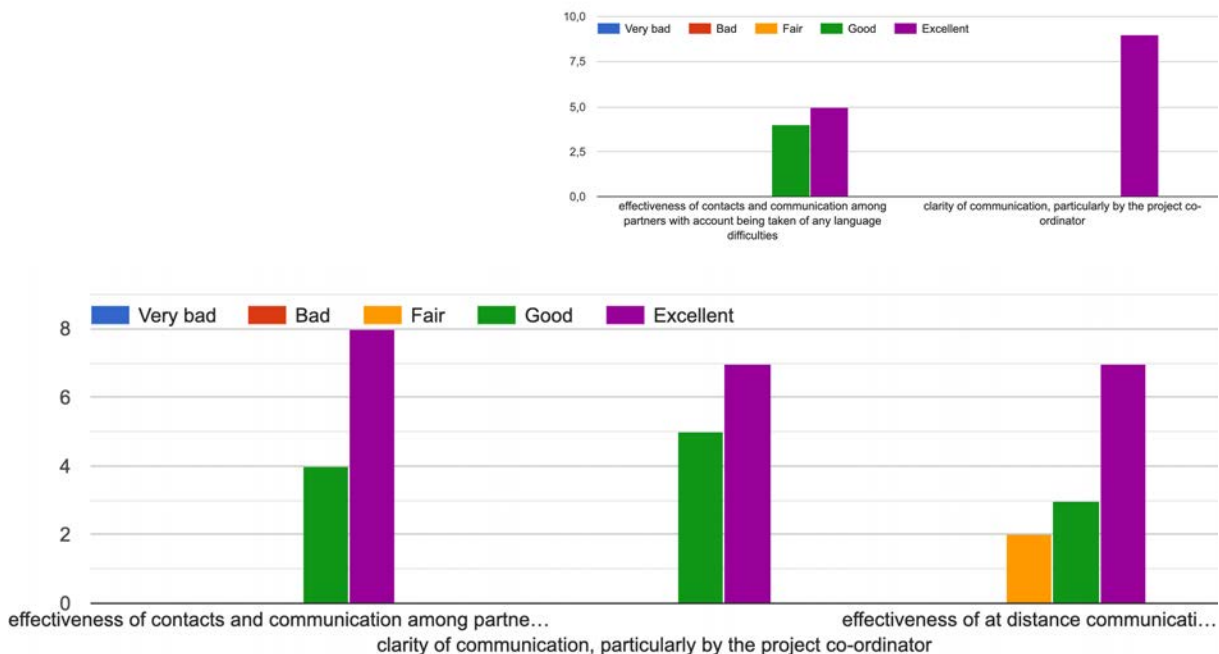


Figure 9. – Results about effective communication – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

It is important to stress that the data collected through this interim report reflect the conditions experimented during the lockdown, so a situation of particular difficulties

and uncertainty, when the partnership maintained a positive attitude both in terms of collaboration and fluency of at distance communication.

Effectiveness of the virtual transnational project meeting (Figure 10).

ROBO-STEAM 28 September 2020 Virtual Transnational Meeting (12 responses)

Please tell us how productive the meeting was using a 1 to 5 scale where 1 means not at all productive and 5 means extremely productive.

12 respuestas

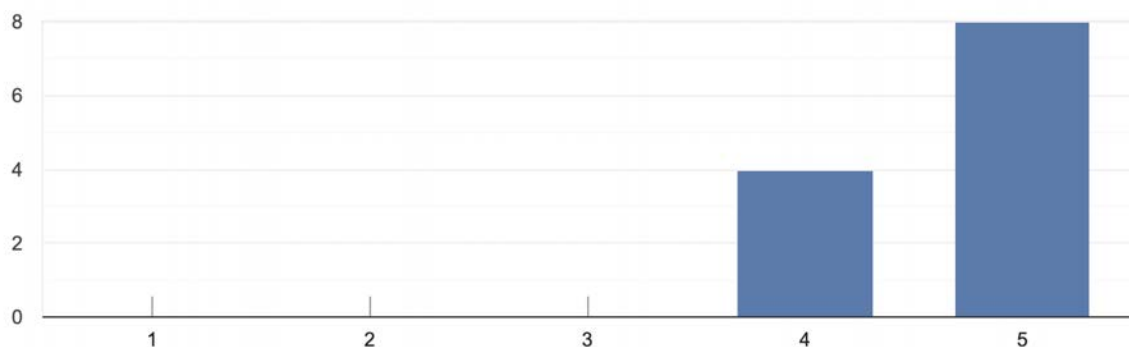


Figure 10. – Effectiveness results for the virtual transnational meeting

Please tell us why you feel that way about how productive the meeting was.

- Important meeting for rescheduling the activities due to Covid-19
- we found ways how to solve the problems caused by COVID-19 pandemic and measures
- Because it has solved all my doubts
- I have to think about all the new proposals to be sure I have understood everything
- Clarification of the new situation and agreements
- Given the circumstances the meeting was very productive
- It was productive, but the exchange of ideas and opinions was not so productive as presential
- The virtual meeting of course does not have the same possibilities to deepen the networking (outside of the actual meeting agenda) than with face-to-face meetings. But it is of course more cost-effective and efficient when one does not have to travel. I anyway personally would prefer "traditional" meetings over virtual ones, only if it was possible!
- It was productive
- Although the meeting lasted a long time, all the programmed objectives were achieved.
- all my doubts have been clarified
- Clarifying relevant aspects

2.3. Quality of the Project implementation

This part of the report focuses on the quality of the activities developed throughout the project duration. The indicators evaluated are the structure of the project, the implementation of the workplan, the quality of project working materials/products, the innovation approach, the quality of the promotion of the European Dimension.

Considering the COVID-19 emergency, part of the activities planned was changed. The main changes related to the project implementation were the following:

- O2.A5 - Application of the kits to STEAM challenges in the defined contexts. It was completed up to a 60% in M18 and a project extension was required so to finish the pilots.
- O2.A6. – Evaluation of the experiences. Only the pilots in one of the partners institutions was finished before the health emergency, so the activity can be considered completed in a 20% up to this month, the next month extension will allow the partners to complete this task.
- O3.A4. - Environment maintenance. Changes were made to correct errors and facilitate the connection between the different components, new collections were added (including one related to COVID-19 adapted tools) and updates in the software.

Regarding the multiplier events they were replanned according to the COVID-19 restrictions at the end of the project.

Regarding students exchanges all except C6 were completed as expected. Specifically, it was possible to complete C2 (during M13), C3 (during M14) and C4 and C5 that take place the same week of the M17. C6 has been rescheduled at the same time of the third transnational meeting. Also, C1, the training event cannot be carried out as expected so it is delayed.

As alternative, additional tasks have been organized inside the outcomes, properly named "COVID activities". These are:

- O2.COVID19_1. Identification of online tools to continue with the project experiments. In this task the universities of the partnership have carried out a

Systematic Mapping Review about the existing tools to be applied for simulate robotics virtually. The idea is to facilitate tools to the schools that make possible to address challenges such as the proposed by project even in COVID-19 times, that is virtually or in blended contexts.

- O3.COVID19_1. After the identification of these tools the project universities propose two possible tools to be applied SUFFER and HIL prototype. Both of them were adapted to be applied virtually and later the idea is to test them with the schools during the Hackathon and C6.
- O2.COVID19_2. Test the tools during the Hackathon and C6. The schools of the partnership tested the tools during C6 and help to report problems that should be addressed and improve them to be applied in the specific pandemic context.

The Figures below show the total responses collected from the periodical monitoring questionnaire M24 about the project implementation and the survey takes in account the changes described above.

Interim Monitoring surveys

Tool: Internal monitoring questionnaire

Period October 2019 - September 2020 (Tot. 12 responses)

Structure of the project (Figure 11).

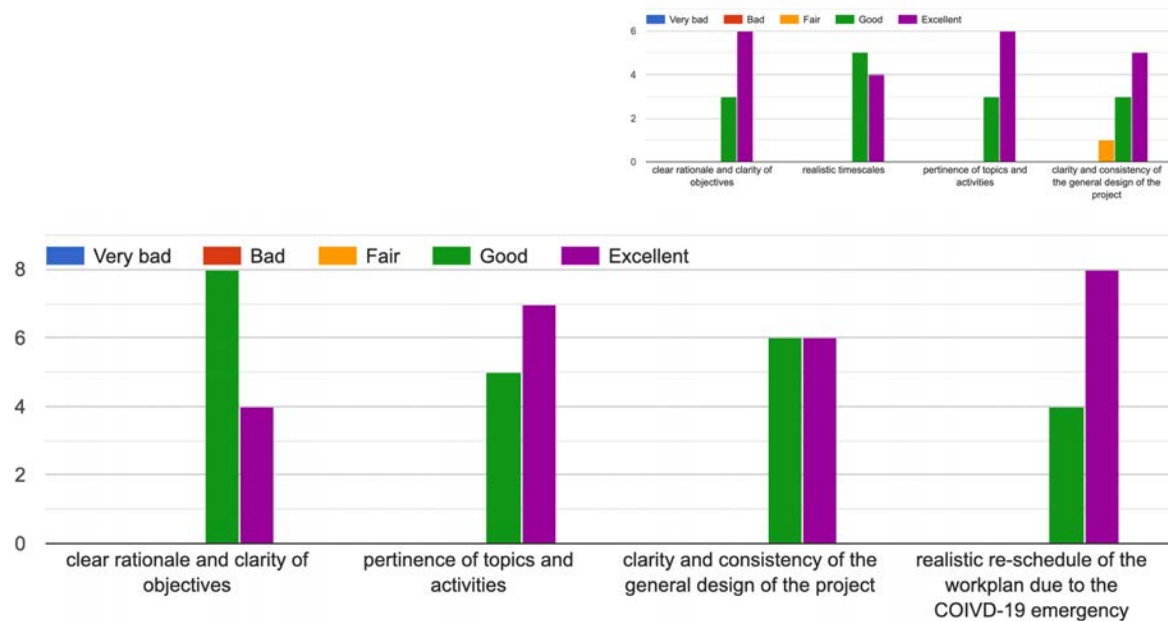


Figure 11. – Results about the Project structure – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Implementation of the work plan (Figure 12).

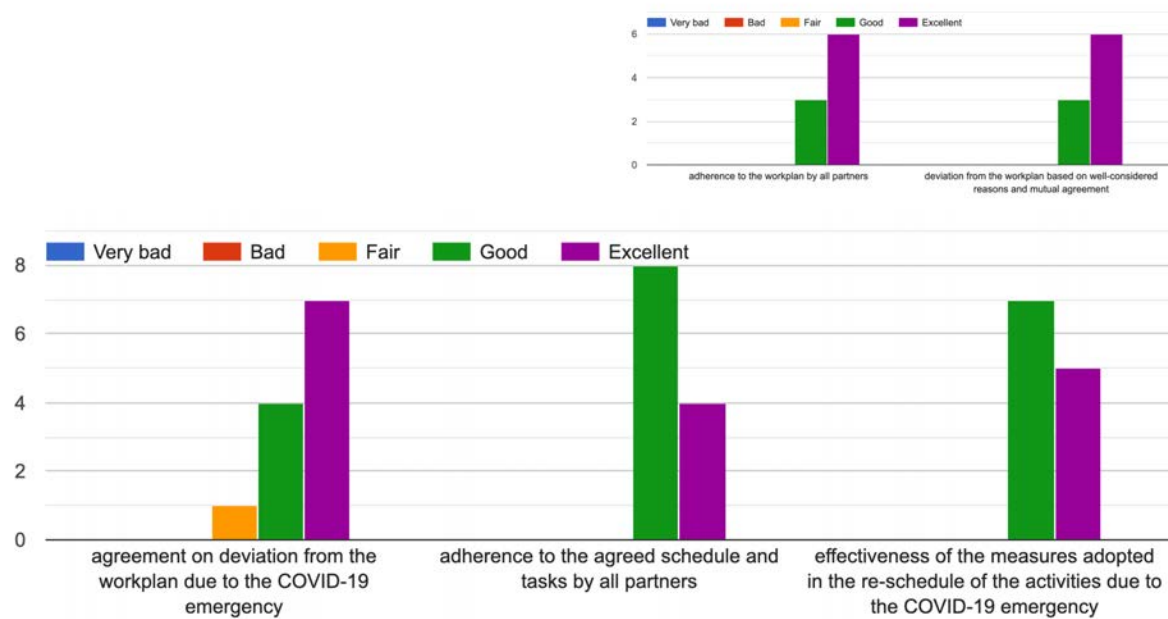


Figure 12 – Results about the implementation of the work plan – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Quality of project working materials/products (Figure 13).

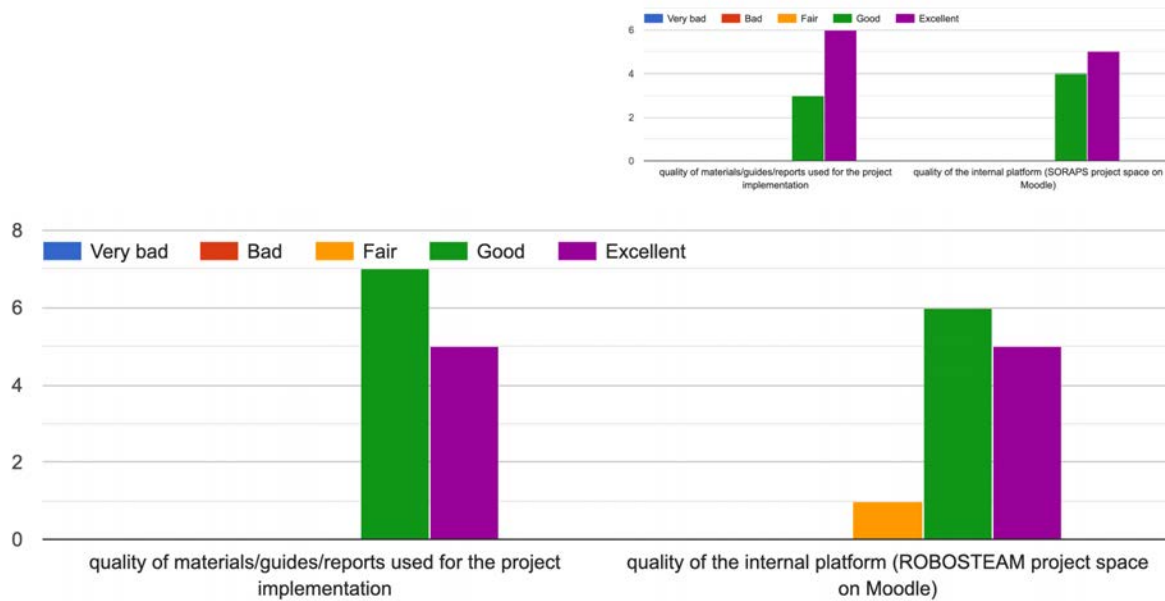


Figure 13. – Results about quality of Project working materials/products – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Innovation and variety of the approach (Figure 14).

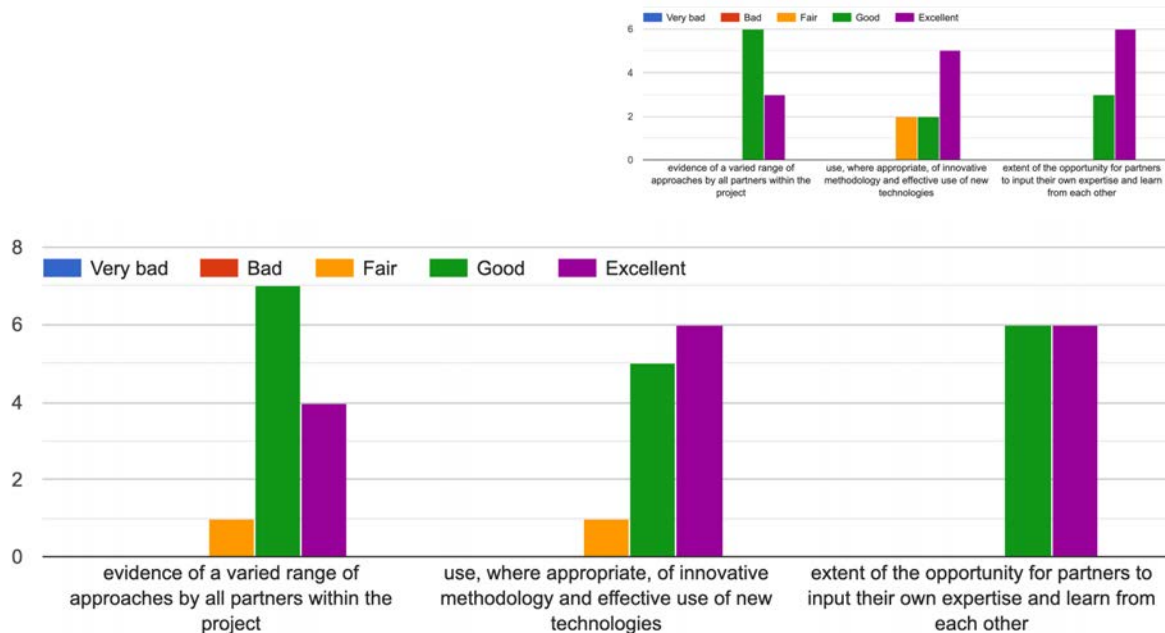


Figure 14. – Results about innovation and variety of the approach – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Support within each partner organization (Figure 15).

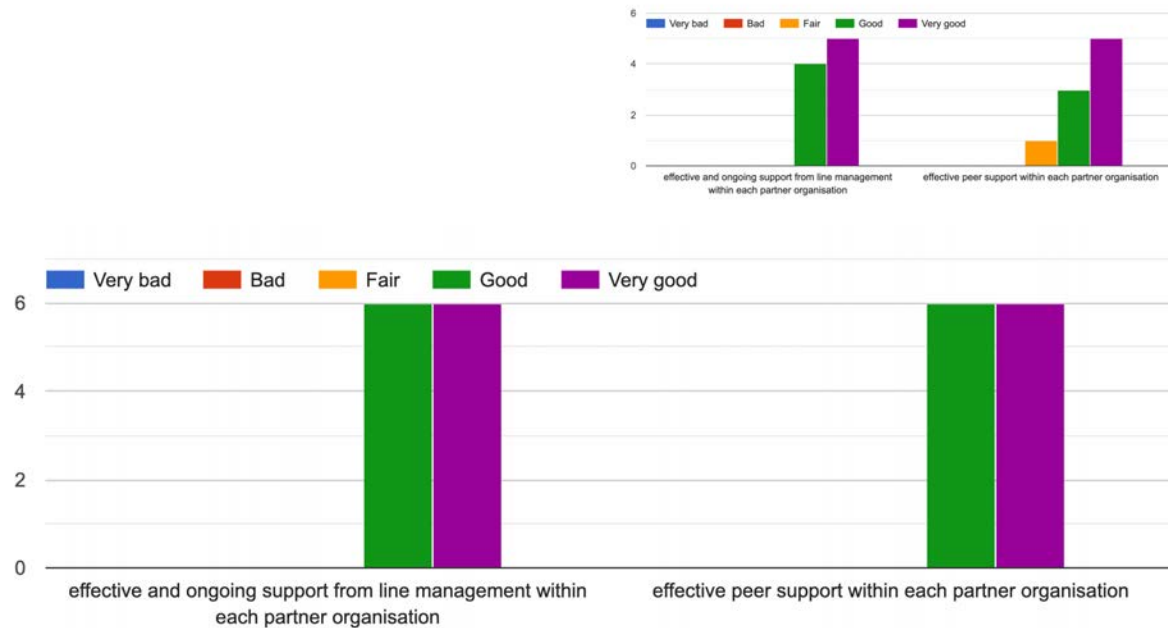


Figure 15. – Results about support each partner organization – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Quality of the promotion of the European Dimension (Figure 16).

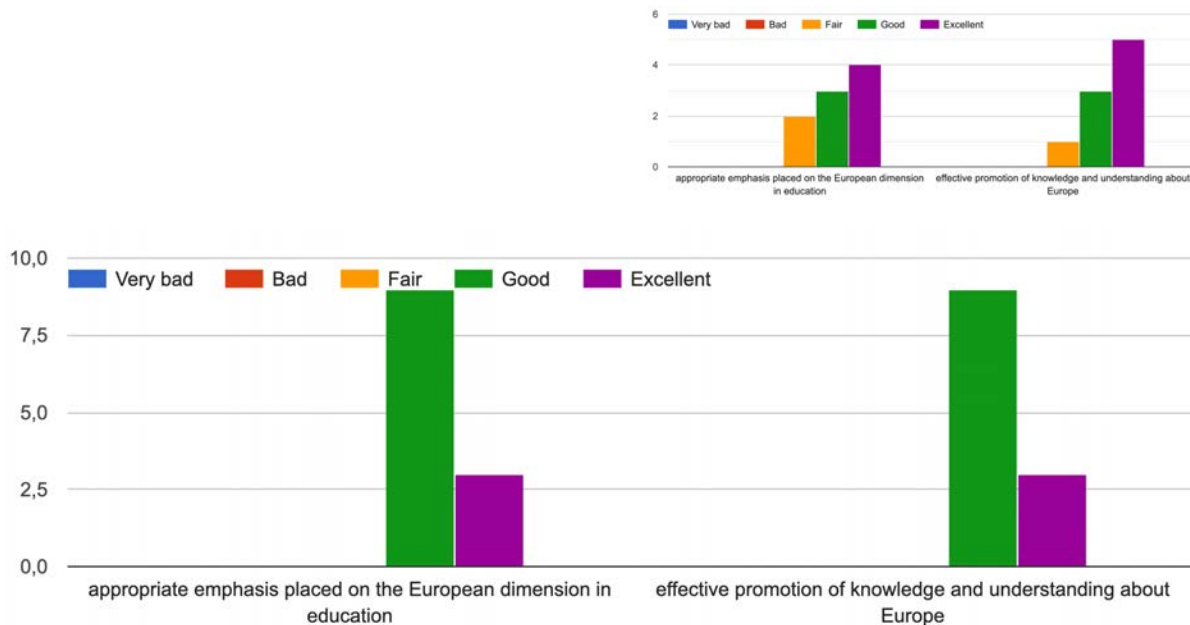


Figure 16. – Results about quality of the promotion – 9 responses top corner (M1-M12) and 12 responses (M13-M24)

The partnership is reacting with a very good attitude to the difficulties of the situation and quality and innovation seem to support well the stress of the lockdown. The support among partners works very well.

3 KEY PERFORMANCE INDICATORS

3.1. Project Management Indicators

Performance Indicator	Themes/issues addressed in the evaluation
Quality of project management arrangements	<ul style="list-style-type: none"> – The commitment and involvement of the partners is very strong and constant along the project.
Effective management and leadership qualities demonstrated by project co-ordinator	<ul style="list-style-type: none"> – The partners appreciate the work and professionalism of the coordinator.
Effectiveness of the process of monitoring and evaluation	<ul style="list-style-type: none"> – The on-going monitoring and evaluation methodology has been well accepted by the partnership, with a very good participation in the questionnaire responses.
Quality of the dissemination process	<ul style="list-style-type: none"> – The arrangements for disseminating project information worked well considering that all the face-to-face initiatives have been cancelled and the only way for dissemination is to adopt exclusively online strategies.
Implementation of the workplan	<ul style="list-style-type: none"> – The implementation of the workplan, taking into account the changes to the activities and schedule due to force majeure, was positively evaluated by the partners.
Integration of project activities into the department's/ institution's development plan	<ul style="list-style-type: none"> – The partnership received a very good support from their own institution and a good reception of the project results is expected.

3.2 Consortium's Engagement Indicators

Performance Indicator	Themes/issues addressed in the evaluation
Strong commitment to the project by each partner	<ul style="list-style-type: none"> – The commitment of the partners is really high and the sense of ownership of the project among the partners is crucial in order to solve in a positive way the restrictions to the organization of the two piloting phases.
Agreement amongst partners	<ul style="list-style-type: none"> – There is good agreement among partners.
Effective and on-going communication amongst partners and with other agencies	<ul style="list-style-type: none"> – The communication processes are fluent so far.
Trust amongst partners	<ul style="list-style-type: none"> – The partners are developing mutual trust throughout the project.
Development of positive attitudes	<ul style="list-style-type: none"> – The collaboration and support during the lockdown was always evaluated very positively.

3.3. Consortium's Work Indicators

Performance Indicator	Themes/issues addressed in the evaluation
Structure of the project	<ul style="list-style-type: none"> – Objectives, topics and activities are evaluated as really good in the internal monitoring surveys.
Quality of the project	<ul style="list-style-type: none"> – Good dissemination strategy has been planned, but the results in terms of impact will be evaluate at the end of the project (considering the extension period approved by the National Agency).
Quality of project materials/products	<ul style="list-style-type: none"> – The first results from the IOs development are positive.
Quality of the promotion of the European Dimension	<ul style="list-style-type: none"> – The project is placing appropriate emphasis on the European dimension, even if the promotion of the project results will depend on the international health situation.
Innovation and variety of approach	<ul style="list-style-type: none"> – The perception of innovation in general is felt as good.

4 Overall evaluation

Interim Monitoring surveys (Figure 17)

Tool: Internal monitoring questionnaire

Period October 2019 - September 2020 (Tot. 12 responses)

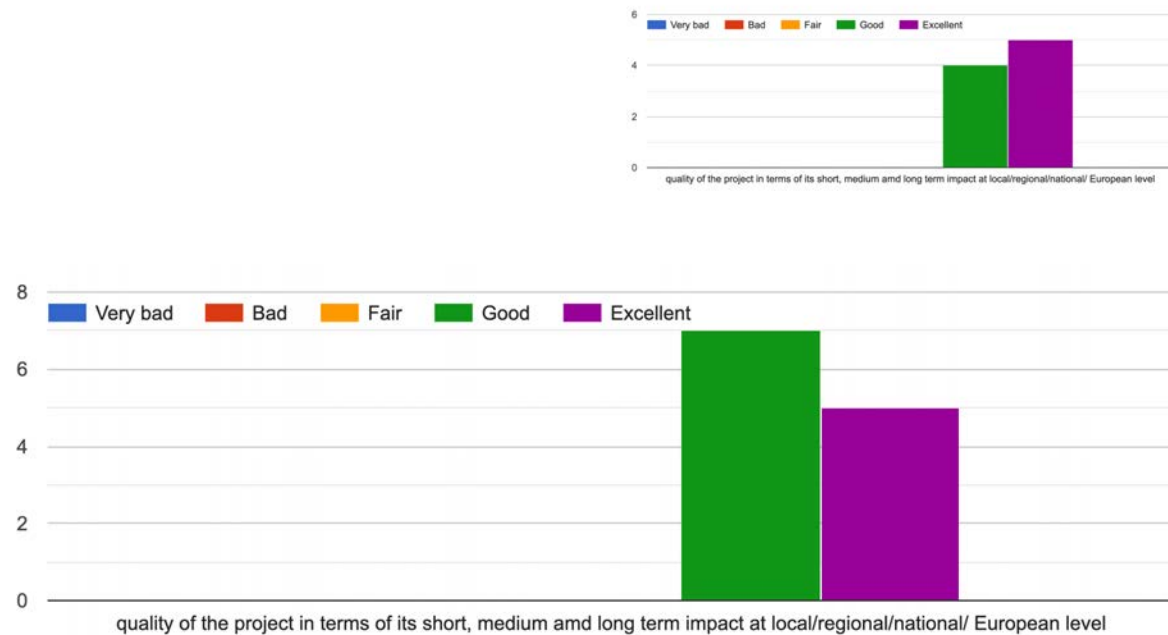


Figure 17. – Results about the overall quality of the project - 9 responses top corner (M1-M12) and 12 responses (M13-M24)

Having analysed the monitoring and evaluation results, we can conclude that the partners are really satisfied with the project implementation.

There are no aspects or situations at risk of calling for specific actions, apart from possible further restrictions due to the pandemic, considering that in all the items which have been monitored, quality of the consortium and activities received the highest rates.

The good reception of the changes to the work plan by the group and the granting of the extension are two factors that will help in the closing phase of the project, which remains however bound to the evolution of the pandemic and the related restrictions not only internationally but also to local level.

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