GOAL 1 FEST interaction:
Facilitators - ECR – students - teachers

Results of Barcelona case study

This document provides a preliminary analysis of the data collected through the workshops in Barcelona by WP4. The analysis refers only to those insights related to WP2 Goal 1 (students' interaction with ECR and teachers), in order to contribute to the redesign of PERFORM engagement strategy with ECR and teachers. The last section provides methodological information that can be useful for framing the analysis.

This is a document for internal use for PERFORM partners.

OUTLINE

GOAL 1 FEST interaction: Facilitators - ECR – students - teachers
Results of BARCELONA case study

GENERAL INFORMATION:

Schools: INS Santa Eulàlia (Terrassa) and IES Castellbisbal (Castellbisbal).

Participants:

- **INS Santa Eulàlia:** 48 students distributed in two different groups of 24 students, each of them supported by 1 PERFORM facilitator, at least 1 teacher and 1 and 2 ECRs, respectively.
- **IES Castellbisbal:** 28 students distributed in two different groups of 14 students, each of them supported by 1 PERFORM facilitator, at least 1 teacher and 1 ECR. Two sessions were supported by 3 extra ECRs.

Setting: 6 workshops were conducted, of two hours each. Each group was placed in a different room, both of them indoors, except for the last session of rehearsal. In the case of Castellbisbal, two sessions took place in the afternoons and one meal with the students and ECRs was organised before these session.

HIGHLIGHTS OF THE RESULTS AND ANALYSIS

- Inputs from the different actors involved suggest that the interaction between students, ECRs and teachers has not reached its full potential despite the fertile ground to foster it, suggested by participants' willingness to participate and their generally appreciative stance towards the project. Such interaction could be fostered through a greater engagement of ECRs and teachers, both before and during the workshops.

- Overall, the teachers were feeling positive about having had PERFORM in their school and showed their willingness to continue with the project in the future, if adapted and with the support of PERFORM facilitators. Teachers provided punctual support to the facilitation in several activities (e.g. the critical thinking stations, the gender role-play) and pointed to the lack of a specific role assigned as a limitation sometimes hindering their involvement during the workshops, especially in Terrassa. In Castellbisbal teachers got generally involved more actively during the debates and the work in small groups than in Terrassa. Students shared the same perception: while in Castellbisbal most of them consider teachers helped them during the workshops (81%), in Terrassa in Terrassa only 46% of the students agreed with this statement and a third of them provided a neutral answer.

- Teachers found the workload generated by the project as compatible with their work. In Terrassa, the tutors of the two groups dedicated time of their own classes to support students with PERFORM homework in-between sessions.

- Teachers' interventions were not always synchronised with the discourse of the facilitators (e.g. regarding gendered stereotypes in Terrassa or in their reaction to students' interventions in Castellbisbal). ECRs also identified this as an aspect to improve.

- ECRs were generally very enthusiastic during the workshops and seemed comfortable with the students. They all reported enjoying the experience, which they generally perceived as 'worth'. Similarly, students seemed curious and attracted by the figure of the ECR and respected them in their interaction. They all appreciated the interaction with ECRs as they do not often have the chance to meet young researchers. They identified the young researchers with highly motivated and hard-working people, committed to their jobs.

- ECRs mainly adopted an assisting role during the workshops, actively supporting the facilitators in the facilitation of the activities (e.g. providing guidelines and making questions to the students to prompt participation, solving doubts, intervening in the plenary discussions). Students especially appreciated ECRs' involvement and engagement with them during the sessions. However, some of them had difficulties to differentiate them from PERFORM facilitators and expressed that they lacked more personal sharing related to the ECRs' day-to-day life and research. Many of them reported they wish they had had more interaction during the workshops. Similarly, ECRs perceived their role was not clearly defined and missed having more opportunities to interact with the students and more guidance through the process. They considered that their interaction with students had a positive impact in fostering students' motivation and curiosity towards science, but that such impact could have been enhanced if they had participated in a more active way.

- All students considered the topic of the PERSEIA as one of their main motivations to participate and argued that they should be given a choice, in any case. However, many of them thought it would be interesting to link their topic to the ECRs research and made different proposals (see below).

- The use of social media did not seem to work well in any of the schools. Students expressed they found face-to-face contact easier and more motivating, and ECRs considered that the openness of the channel hindered the participation of some students (e.g. shy students, students affected by peer-pressure) and dispersed the focus of the conversation. ECRs also reported difficulties in engaging with this kind of technologies and even ethical issues. However, they did not identify an alternative communication channel outside school, except via email.

- ECRs thought that the training had contributed to critically reflect about doing research and to frame their own work, and in this sense, it was useful and needed. However, they also perceived that it lacked connection with the practical work conducted in the schools and sometimes they lacked training skills.

Proposals of improvement:

- Students suggested their interaction with ECRs could be enhanced by: i) increasing the ratio of ECRs per student; ii) increasing the time within the workshops devoted to

interaction with them; and iii) better matching PERSEIAs topics with ECRs research (either choosing the topics of the ECRs or bringing ECRs matching their topics). The role of the ECRs could also be more clearly communicated to students in each session, so they could know what they could expect from them and take more advantage of it.

- The project would benefit of involving the whole body of teachers and generating a closer interaction and collaboration between facilitators and teachers, including more synergies between PERFORM contents and school curriculum. More guidance could be offered to teachers directly participating in PERFORM, through guarantying face-to-face meetings before the project, the sharing and discussion of workshop materials in advanced and the detailed discussion on how to evaluate the students. They also suggested the development of a detailed teachers' guide, to orient further implementation in the schools.

- More attention could be paid to diversity in the classroom, especially in schools of low socio-economic background. Collaboration with school orientation departments while designing and planning the project could foster PERFORM's attention to diversity.

- The workshop guidelines could define more clearly ECRs' role as young researchers (more differentiated from the facilitators) and provide more spaces in the workshops for mutual sharing about science and research between the ECRs and the students. Such guidelines could also be jointly discussed among facilitators and ECRs with time before the workshops. Both things could help clarify ECRs' role and make more explicit what is expected from them through the process, but also to prepare some of their interventions in advance, so they could orientate them towards showing a more personal and critical perspective of science.

- Linking the PERSEIAS to ECRs' research topics could potentially enhance their contribution as researchers and increase their interaction with students. Also, having more time for face-to-face sharing with the facilitators in-between workshops could help ECRs reflect about their interventions and better understand the process.

- ECRs answers also pointed to the need of better adapting the training to the practical experience of the workshops. More training could be delivered on the interaction with the students, covering aspects such as how to deal with students, how to motivate them –especially when they did not want to participate, or how to support them in the creative process.

These highlights provide a global view of the data collected from the different actors involved through the workshops (students, ECRs and teachers). The following sections provide more detailed information, organised according to the data gathering method applied (observation, surveys, focus group and interviews) and the actors involved.

1) OBSERVATIONS DURING THE WORKSHOPS

OBSERVATION HIGHLIGHTS FROM THE CASE STUDY:

- Teachers did not have a defined role during the workshops and their attitude has been mostly that of engaged observers, with a varying degree of involvement depending on the teacher.
- ECRs were generally very enthusiastic when sharing with the students and very supportive during the sessions. They seemed comfortable with the students.
- Students generally paid attention to ECRs interventions and received well their comments. They seemed curious and attracted by the figure of the ECR and respected them in their interaction.
- Teachers provided punctual support to the facilitation in several activities (e.g. the critical thinking stations, the gender role-play).
- With a few exceptions, in Castellbisbal teachers got involved more actively during the debates and the work in small groups than in Terrassa.
- ECRs were more involved in the sessions than the teachers and adopted an assisting role during the workshops, actively supporting the facilitators in the facilitation of the activities (e.g. helping with the warm-up, supporting the main group activity, taking notes, facilitating conversation among students, etc.).
- ECRs had also a few chances of introducing their research and their experience, mostly during the first three sessions (e.g. introducing their research the first day, participating in the group discussions).
- Teachers' interventions were not always synchronised with the discourse of the facilitators (e.g. regarding gendered stereotypes or in their reaction to students' interventions)

The following subsections provide detailed information on the observations gathered in both schools : INS Santa Eulàlia (Terrassa) and IES Castellbisbal (Castellbisbal). Furthermore, students' responses to surveys and the focus group, together with the interviews with teachers and ECR (sections 2 to 5) provide additional insights on such interaction.

Observations from INS Santa Eulàlia (Terrassa)

Involvement of the teachers and interaction with students

In group 2 (4º A)[1] most of the sessions were accompanied by the teacher of Spanish, a young female teacher temporarily hired by the school to substitute their teacher. Although she seemed enthusiastic, her involvement was variable and generally passive. During the first session she seemed curious, but participated actively only in the round of introductions and warm-up. After that, she remained rather passive and was involved in watching one of the tables during the table game. At the middle of the session a second teacher (science teacher) came in. She joined directly the Spanish teacher, without being informed by anyone from the project about the ongoing activity. The two teachers talked among them aside from students' discussion until the presentation of cards by the students. During the third session, which was devoted to the gender role game and discussion, the teacher remained passive and when the second teacher arrived, they began a non-stop chit chat. This talking seemed to be quite distracting from the actual work

[1] We have named the groups in each school, so that group 1 corresponds to the group that was observed throughout all the sessions and group 2 to the group that was observed intermittently (session 1, 3 and 6).

that the facilitator was doing. During the last session, the teacher was moving around the groups and was helpful to one of them, which did the monologue about mobile phones.

Group 1 (4º B) was in most of the workshops accompanied by the teacher of Catalan, who stayed during the whole session, and a second teacher who was intermittently coming during the second hour (not staying the whole time and changing through the sessions). The involvement of the main teacher during the sessions was generally low, although he expressed orally several times his willingness to participate. He got more involved towards the end of the project, but his participation was quite punctual. The role of the second teacher in the second half of the session was that of passive observer.

The attitude of the teacher was very similar in the first two workshops. He arrived 10 minutes late to both of them, consequently missing the introduction of the workshop during the first day. Although he was present in the sessions (e.g. sitting with the group of students, paying attention to the facilitator and students' interventions), most of the time he did not participate actively -not even to look after the students when they were loud. He intervened only once at the end of the first session to motivate the students to participate, by mentioning that what they did would be taken into account for their mark in Catalan. When the first session ended, he approached us (the PERFORM team) and expressed his willingness to participate if anything was needed from him. He seemed though quite lost about the project and about his participation. He asked the facilitator, for instance, if we were an agency (he did not seem to recall we were a team of communicators, researchers, etc. conducting a research project). The teacher also participated actively in the stations exercise of the second workshop by facilitating one of the stations (i.e., providing the questions to students, solving some doubts about the text with them and asking for silence). However, when the activity ended he worked until the end of the session on a document of his own, disconnecting from the discussion (he told me afterwards he needed to do that work during the morning, as a favor to another teacher). Another teacher (head of studies) was also present during this second half and she had a passive role as well, connecting and disconnecting from the activity. For instance, at one moment, students asked a question about the marks to the facilitator, which she could not answer, and none of the teachers intervened at all to clarify it.

The third and fourth workshops (Gender and Art & science) took place at a different day and time, so instead of the Catalan teacher, the session was accompanied by the teacher of technical drawing (third workshop) and the Physics & Chemistry teacher and the director (fourth workshop). The three teachers participated in a more active way than the teacher in the sessions before, despite not having a specific role in the session. For instance, the drawing teacher participated intermittently since the beginning of the session, in which he took part of the warm-up with students. Students seemed to have a relaxed relationship with him and laughed with him during the warm-up, surprised by his participation. During the gender discussion, the teacher was following the debate and made a couple of interventions reinforcing gendered stereotypes (e.g. male qualities are the qualities to be successful; women are harder with each other than with men), which were quite opposite to the reflections that the facilitator was trying to convey at that moment. Both teachers in the fourth workshop were also attentive and supportive: they listened to the facilitator and students' interventions and during small group work they went through the groups making questions and listening to the students. In group 2, during the review of the monologues, I observed that students did not talk much when the director was present, they seemed to have a lot of respect for him. During the second part, the physics teacher needed to ask for silence sometimes, but without engaging in a controlling attitude. The head of studies and a third teacher passed by during the third workshop, but without engaging in the activities.

The fifth workshop (performing skills) was at the common day and time and the Catalan teacher was the only teacher present. He arrived around 10 minutes late. During the first part of the workshop, he was disconnected of the activities since one student didn't feel well and he took her out of the classroom to call her parents. However, during the second part of the session, the first rehearsal of monologues, he was very focused on the activity and participative. He took notes of each of the students' monologues and then provided feedback to them, suggesting specific changes and also recognising their work. His attitude was quite spontaneous without waiting for the facilitator to ask him.
Nonetheless, during the last workshop, devoted to finish the text and rehearse the monologues, his role was quite passive again. The head of studies arrived for the second half and none of them had any role in the session. Both teachers sat while students prepared their monologues and watched their performances without intervening. This attitude highly contrasted with the one in the previous session.

Involvement of the ECRs and interaction with students

In group 2, there was one female ECR involved and her role got progressively more active as the sessions evolved. Due to a mislead, she was not introduced as a researcher in the first session (i.e., she could say her name but did not introduce herself and her research, which she did in the second session). This seemed to hinder the visibility of her role as a researcher supporting students, as during this first session they asked directly for help only to the facilitator. Still, she assisted the facilitator during the session, taking notes in the blackboard while introducing the workshops, and being in charge of one of the cards' table during the cards' game. When students were asked to discuss in small groups, the facilitator and the female ECR were moving between the 5 groups. At this point, she seemed not to know exactly what she had to do, but she followed the facilitator to hear what he was explaining and then, went alone to check the groups.
In the third session the ECR kept an assisting role, helping the facilitator with the facilitation during the role game (she went out with the students) and asking a couple of questions during the plenary debate. During such debate, she also shared with the students her views about women having babies versus male colleagues having babies, according to her experience working in the STEM research world. During the last workshop, the ECR supported the students trying to answer the questions they had and motivating them to work.

Group 1 was accompanied by two ECRs, one female and one male, researching in the fields of leukaemia and Nano-capsules, respectively. Generally, the ECRs were very enthusiastic during the workshops and the students responded accordingly.

Both ECRs attended together the three first workshops. During these sessions, they were very active in supporting the facilitation. During the first workshop, they participated in the warm-up, helped the facilitator with the materials (e.g. organizing the cards, taking notes in the blackboard) and interacted with the students when they were in small groups (i.e., facilitating the conversation). Besides, each ECR had five minutes to introduce their research and answer students' questions. They were both cheerful and open, and seemed comfortable and confident with the group. During the second workshop, they intervened in the first presentation about how to search for information (e.g. adding reflections to the facilitator's and sharing their experience about how they identified their research questions) and took care of one the stations each, facilitating students' discussion during small group work. Interestingly, students paid a lot of attention to the ECRs when they talked. For instance, at several moments of group dispersion, they got focused again in the discussion thanks to the intervention of an ECR. It seemed students respected them and were interested/attracted by their figure, which some of them associated

to experts. For instance, during the discussion on critical thinking when asked about trusting information, one girl mentioned that she would trust more what the ECRs say that the information in google, since "they are the experts". During the third workshop (gender), both ECRs continued to be active and integrated within the facilitation. However, the female ECR participated much more in the gender discussion, making questions to students, commenting on their answers and sharing a personal experience about gender discrimination.

From workshops 4 to 6 only one ECR attended each session and although their attitude remained the same, their participation decreased a bit. The fourth session was accompanied by the female ECR. Her role remained more passive during the plenary discussion (she listened to the main facilitator), to become then active during the small group work, which she supported co-facilitating. Her attitude towards the students was very positive and cheerful and many of her interventions were addressed to motivate them. She also presented the learning charts (as suggested by the facilitators). Interestingly, students noticed at the beginning of the session the absence of the second ECR and asked about him. Also, one of the small groups working on nano-capsules sent him a whatsapp to ask him for doubts. This was the last session of the female ECR, since she had a research stay abroad afterwards. During the fifth session, the ECR had also a less active role during the first 40 minutes of the session and Helena facilitated all the performing exercises and guided the conversation. During the second half of the session, he supported more actively the facilitator by performing in one of the communication exercises, facilitating small group work and providing feedback to the students during the first presentation of monologues. During the last workshop, devoted to rehearsal, there is no specific task facilitated by the ECR and not much facilitation in general to support with. The ECR intervened from time to time in the small groups and the performance of monologues to give some feedback.

Observations from IES Castellbisbal, Castellbisbal

Involvement of the teachers and interaction with students

The teachers' role during the observation has been, to sum up, that of engaged observers.

In group 1 (4º B), all sessions but one (session 4) were accompanied by the sociology teacher, a middle aged man that has been on the job for 20 years. He was very engaged and incredibly excited about the project from the onset. He would come as observer to the sessions but would end up lending a hand to the facilitator, either helping students with any questions they might have or taking on a more active role (like being the chief interviewer in session 3 or having control over one of the news stations in session 2). He missed session four because he had to come and go several times which meant he lost track of what was happening. He also provided very interesting feedback for the PERSEIAS on session 6.

At the end of the sessions he would approach PERFORM team and tell us how excited he was about this project and what he thought had worked in that session. He was very surprised to see the behaviours of the students during the workshops, particularly those he thought would either be quite confrontational or would want to drop out. He was also glad to see a couple of students that had problems with other students at school mingle well and look happy and confident.

Students seemed to feel comfortable around the teacher and asked him questions with regards to activities or vocabulary they were not understanding. The teacher clarified whatever doubt and let the workshop flow, making it very clear that the lead was held by the facilitator.

In group 2 (4º A), most sessions were accompanied by the chemistry teacher, a young woman; though in some sessions there were two teachers, the other one was the chief of studies at the school. The chemistry teacher was present, but her engagement varied from session to session. In the first session she was quite strong in her interventions, challenging students and also making sure that students were doing their work. We are unclear to what point this may have impacted the facilitators' role. In some sessions she became more engaged and took on the role of giving a different perspective to that of the facilitator and encouraging in this way more dialogue and a critical perspective. That was the case in session 3, during the debate about gender. She also took part of the the news stations in session 2. In session 6 (rehearsal of the monologues) she was listening engagedly but did not provide a lot of feedback. She was more skeptical about the project and she gave insightful clear comments about aspects she thought that could improve.

During the sessions her comments were rather more intense than the teacher in group 1, she seemed to be critically assessing the project with a certain detachment that has enabled her to be precise and direct with her feedback to PERFORM team.

Involvement of the ECRs and interaction with students

In group 1 (4º B) ECRs were generally supportive towards the students and helped them understand the information (in session 2 with the news stations) and helped very actively when the students were in small groups so each small group had an adult. The first session was attended my one male ECR, who helped students understand terms. He presented himself in a very particular way (which he had prepared at home), trying to emulate the cards used in the activity they had just done. It did not really look like it had been understood. From session 2 onwards, there was a female ECR. She introduced her research in session 2 in a rather short

time. She took one of the news stations and helped students clarify the words they got stuck on. In session 3 she helped facilitate one of the groups when the group broke into their PERSEIA teams and also helped facilitate the interview, taking the interviewees outside of the classroom and calming students down when they were nervous. In session 4 there was another ECR in addition to the female that had been since session 2. He was a male ECR, quite older than the others and had a research background on theatre. This is a session where his feedback and help came in really handy so at the second half of the session he was really hands on with the students helping them develop their PERSEIAS. A new ECR attended the fifth session, to subtitute the female researcher who could not come. He was very enthusiastic towards the students and helped the facilitator with the performing skills exercises. During the work in small groups he seemed to lack a bit of guidance and spent some time just listening before interacting with the students.

In group 2 (4º A) one female ECR followed all the sessions. She was very active and became quite engaged with the students along the process. In the first session she helped dynamise the session asking questions and listening very actively to the facilitators' instructions. At the end she explained her research and was asked questions by the students. She was very passionate about her research, which seemed to transfer into the students. They received that information well and liked to hear about different paths towards a scientific career. In session 3, she also helped facilitate the interview and during the debate afterwards, challenged students' assumptions on gender.

In the last workshop, both groups of students were together to rehearse their PERSEIAs. There were 5 ECRs and it was a very nice session because all the ECRs were giving very hands on feedback to each PERSEIA, the ECRs seemed very motivated providing feedback and it was encouraging. Four ECRs participated in the warm up and students seemed incredibly relaxed amongst the facilitators and the ERCs.

1) STUDENTS' INPUTS (I): WRITTEN SURVEYS

- Students showed contrasting perceptions about the support of their teachers depending on the school. While in Castellbisbal most of the students (81%) considered that teachers had supported them, in Terrassa a bit less of half of the students agreed with this statemtn and a third of them provided a neutral answer.
- Between 46% and 64% of the students (in Terrassa and Castellbisbal, respectively) reported that they wish they have had more interaction with young researchers. However, around a third of them seemed indifferent to this issue (no agreement or disagreement).
- Students do not seem to have often opportunities to interact directly with scientists in Terrassa (either in science museums or in research centers), while students in Castellbisbal reported more frequent visits to science museums. Therefore, results seem to confirm an impact of the socio-economic background, which needs to be explored in further analysis, together with the impact that such a low contact with scientifics might have on students' interest towards science.

INS Santa Eulàlia (Terrassa)

Students' interaction with teachers

We analysed students' degree of agreement to a statement in the post-PERSEIA survey related to their interaction with the teachers (i.e., *"During the workshops, the teachers helped us doing the tasks*"). Forty-four students (28 girls and 16 boys) answered to the questionnaire post-PERSEIA.

Almost half the students (48%, 19 students) considered that teachers helped them doing the tasks during the workshops. However, almost one third of the students answered neutral (30% - 12 students) and 20% of the students (9 students, among which 6 from 4º B) did not agree with the statement. No statistically relevant differences between boys and girls or between the groups were found.

Students' interaction with ECR

We also analysed students' degree of agreement to a statement in the post-PERSEIA survey related to their interaction with the ECRs (i.e., "*I wish I could have had more interaction with the young researchers (names in each school"*). Again, almost half of the students (48% - 19 students) reported that they wish they have had more interaction with young researchers. However, around a third of the students (15), provided a neutral answer, suggesting that there is also a group of students that feel indifferent to this issue. Only 7 students (5 from the group 2 - 4º A) did not report wishing more interaction with ECRs. There were no statistically relevant differences in students' answers between sex or group.

In the next section, students' focus group results deepen in this point. We will also test in further analysis if such different perceptions about the interaction with ECR are be related to the students' previous contact with science and scientists outside school. As Figures 3 and 4 show, students were also asked about the frequency with which they visited scientific sites, i.e., i) science museums, festivals and exhibitions and ii) research centers (e.g. universities, research

institutes). Results show that more than half of the students do not visit science museums or research centers, a trend that is a little sharper in the case of research centers (65% of the sample, while 57% for the museums). However, one third of the students reported that they visit both kind of sites at least once a year, which could be partially explained by visits organised within the school (partially, since the high percentage of students not visiting museums cannot be explained only by absenteeism, which is common in this school) and by visits with their families and/or other institutions outside school. Only five students reported visiting scientific museums or research centers on a monthly basis, which could suggest a marginal very supportive family context in relation to science.

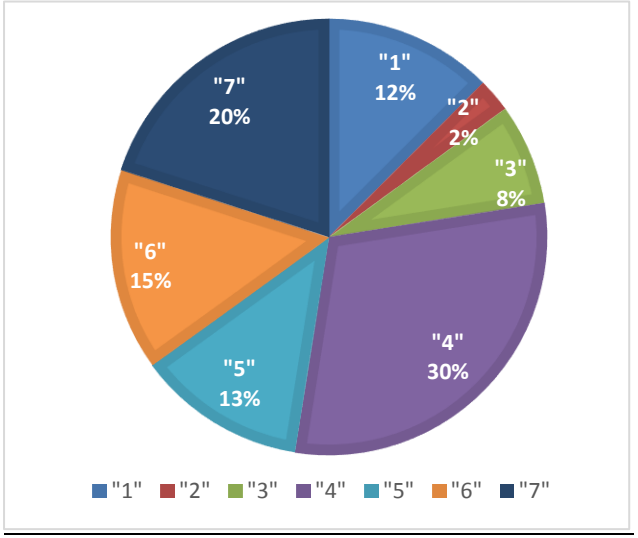
Finally, to complete this approach, we explored whether any insights related to the ECRs or the teachers appeared among students' answers to open questions related to their experience of the workshops (i.e., "*What did I like the best during the workshops and the PERSEIA? What did I like the less?"*; and *"What did I learn?"*). Only two students mentioned something they liked in relation to the presence of the young researchers. Both made reference to the atmosphere created thanks to the ECRs:

> *"The mood generated with the scientists and when they explained things, they did it in such a way that we paid attention"*
>
> *Girl 106, Terrassa*

> *"The company of the scientists, who were really nice and taught us at the same time"*
>
> *Girl 1112*

In relation to what they learnt, students did not elaborate much in this question but 16 students identified specific scientific topics (beyond "learning about science"). Among these, 11 students mentioned topics related to nanoscience (e.g. nano-capsules, medical drugs, lab-on-a-chip). This was the research topic of one of the ECRs in group 1 and was chosen by two groups of students for their PERSEIA.

Figure 1 During the workshops, the teachers helped us doing the tasks. Scale of agreement: from 1 (strongly disagree) to 7 (strongly agree).

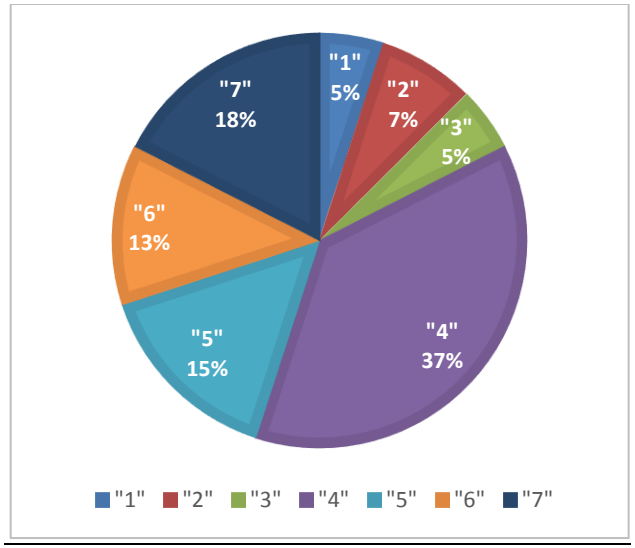


According to the group			
	Frequency		
PostLikertQ4	Whole Sample	Group A	Group B
1	5	1	4
2	1	0	1
3	3	2	1
4	12	6	6
5	5	2	3
6	6	4	2
7	8	4	4
Total	**40**	**19**	**21**

According to the sex			
	Frequency		
PostLikertQ4	Whole Sample	Boys	Girls
1	5	2	3
2	1	0	1
3	3	1	2
4	12	5	7
5	5	3	2
6	6	1	5
7	8	1	7
Total	**40**	**13**	**27**

** 40 students (27 girls and 14 boys) answered to this question; 4 students didn't answer.*

Figure 2 I wish I could have had more interaction with the young researchers. Scale of agreement: from 1 (strongly disagree) to 7 (strongly agree).

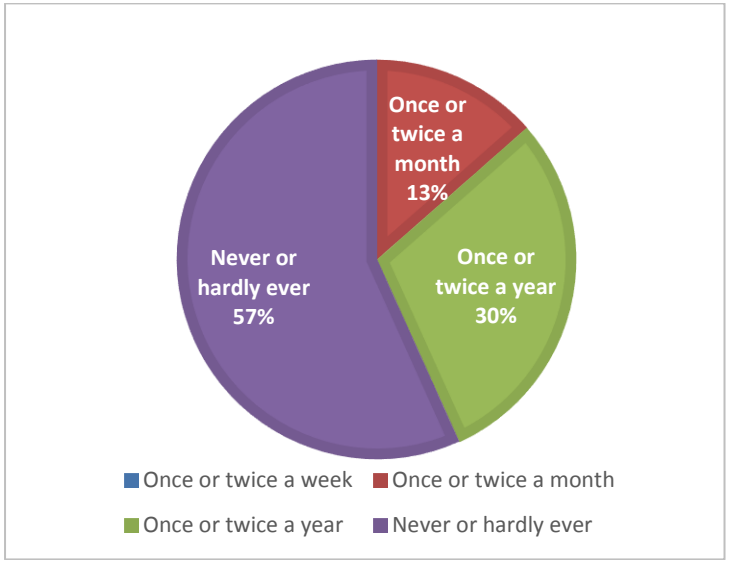


According to group			
	Frequency		
PostLikertQ5	Whole Sample	Group A	Group B
1	2	1	1
2	3	3	0
3	2	1	1
4	15	8	7
5	6	3	3
6	5	2	3
7	7	2	5
Total	**40**	**20**	**20**

According to the sex			
	Frequency		
PostLikertQ5	Whole Sample	Boys	Girls
1	2	1	1
2	3	2	1
3	2	0	2
4	15	5	10
5	6	1	5
6	5	3	2
7	7	2	5
Total	**40**	**14**	**26**

** 40 students (27 girls and 14 boys) answered to this question; 4 students didn't answer.*

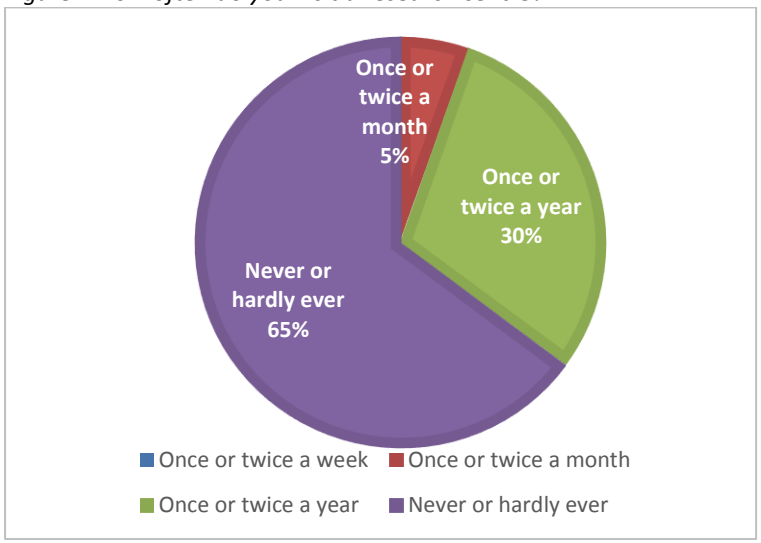
Figure 3 How often do you attend a science museum, science festival or scientific exhibition?



	Visiting science museums, festivals, exhibitions			
	Once or twice a week	Once or twice a month	Once or twice a year	Never or hardly ever
TOTAL*	0	5	11	21
BOYS	0	3	3	9
GIRLS	0	2	8	12

** 37 students answered to the pre-PERSEIA questionnaire (15 boys and 22 girls, from both groups).*

Figure 4 How often do you visit a research centre?



	Visiting research centers			
	Once or twice a week	Once or twice a month	Once or twice a year	Never or hardly ever
TOTAL	0	2	11	24
BOYS	0	1	4	10
GIRLS	0	1	7	14

IES Castellbisbal (Castellbisbal)

Students' interaction with teachers

Twenty-two students (13 girls and 9 boys) answered to the questionnaire post-PERSEIA. Regarding their interaction with teachers (see Figure 5), most of the students reported that teachers helped them doing the tasks during the workshops (81% - 17). Only 3 students did not agree with this statement and all of them belonged to group 2 (4ºA). No statistically relevant differences between boys and girls or between the groups were found.

Students' interaction with ECR

Regarding their interaction with ECRs (see Figure 6), 64% of the students in Castellbisbal (14 students) reported that they wish they had had more interaction with ECRs. However, and similarly to Terrassa, more than one third (36%, 8 students) provided a neutral answer, suggesting that there is also a group of students that feel indifferent to this issue. Differently to Castellbisbal, no student reported not wishing more interaction with ECRs. There were no statistically relevant differences in students' answers between sex or group, except that a higher proportion of students belonging to group 2 provided neutral answers.

When asked about the frequency with which they visited scientific sites, students reported a frequency of visits to science museums and exhibitions higher than in Terrassa: 80% of the students reported visiting such places once or twice a year (see Figure 7). This could be related to visits scheduled by the school, and also to a family background more supportive in relation to science. In contrast, as Figure 8 shows, numbers drop for research centres and only 26% of the students reported visits on a yearly basis, while 64% reported never or hardly ever visiting research centers; which suggests little contact with sites were science takes place.

Finally, regarding students open questions, three students mentioned something they liked in relation to the presence of the young researchers:

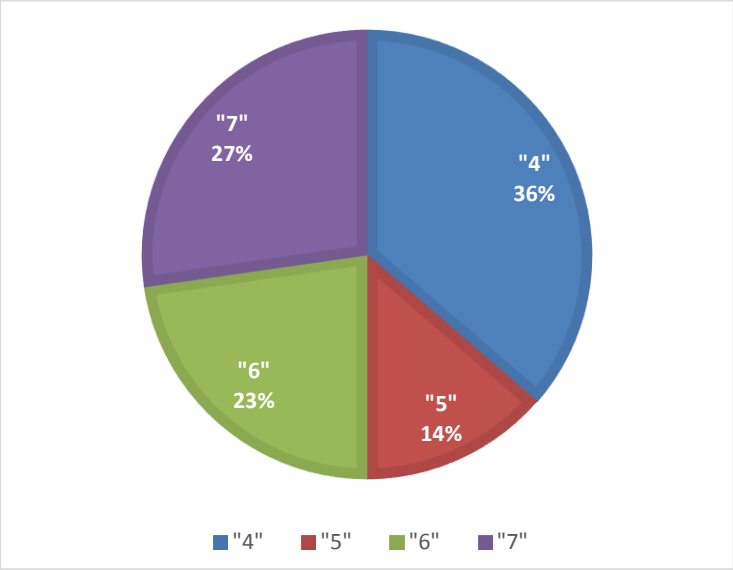
"The talks by the scientists and participating with their help"
Girl 114, Castellbisbal

"Scientists' sense of humour"
Girl 116, Castellbisbal

"To learn some scientific knowledge and speak with scientists"
Girl 204, Castellbisbal

Among the things they have learnt during the project, one student also reported "*to see the job of a researcher*" (SP1204). Five students reported specific scientific topics beyond "learning about science" or "my PERSEIA topic" and no student reported learning about the ECR specific research topics.

Figure 5. During the workshops, the teachers helped us doing the tasks. Scale of agreement: from 1 (strongly disagree) to 7 (strongly agree).

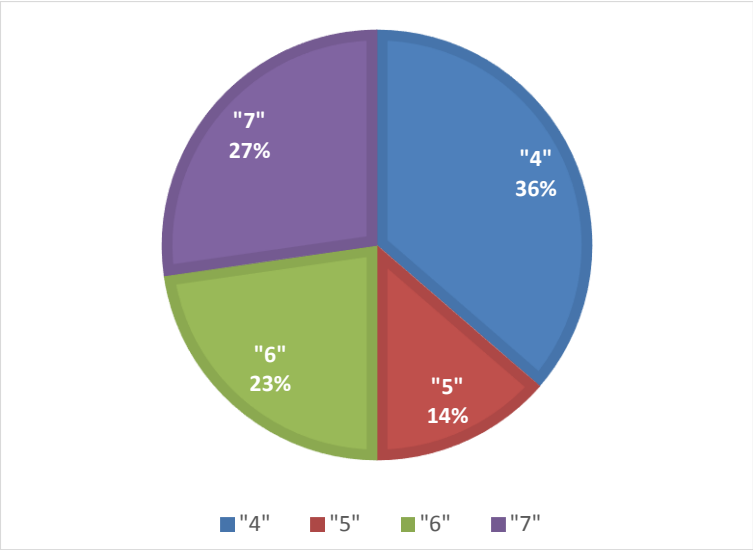


According to the group			
	Frequency		
PostLikertQ5	WholeSample	Group A	Group B
1	0	0	0
2	0	0	0
3	0	0	0
4	8	5	3
5	3	0	3
6	5	2	3
7	6	4	2
Total*	**22**	**11**	**11**

According to sex			
	Frequency		
PostLikertQ5	WholeSample	Boys	Girls
1	0	0	0
2	0	0	0
3	0	0	0
4	8	5	3
5	3	0	3
6	5	2	3
7	6	2	4
Total	**22**	**9**	**13**

** 21 students (12 girls and 9 boys) answered to this question ; 1 did not answer.*

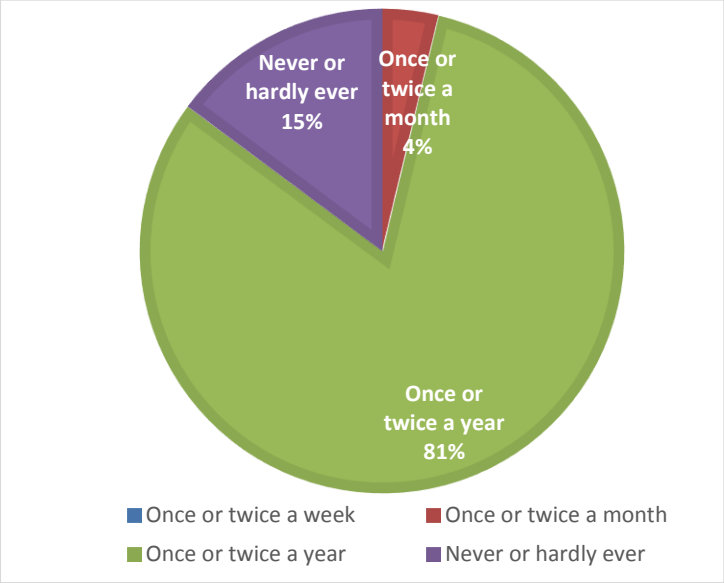
Figure 6. I wish I could have had more interaction with the young researchers. Scale of agreement: from 1 (strongly disagree) to 7 (strongly agree).



According to the group			
	Frequency		
PostLikertQ5	WholeSample	Group A	Group B
1	0	0	0
2	0	0	0
3	0	0	0
4	8	5	3
5	3	0	3
6	5	2	3
7	6	4	2
Total	**22**	**11**	**11**

According to sex			
	Frequency		
PostLikertQ5	WholeSample	Boys	Girls
1	0	0	0
2	0	0	0
3	0	0	0
4	8	5	3
5	3	0	3
6	5	2	3
7	6	2	4
Total	**22**	**9**	**13**

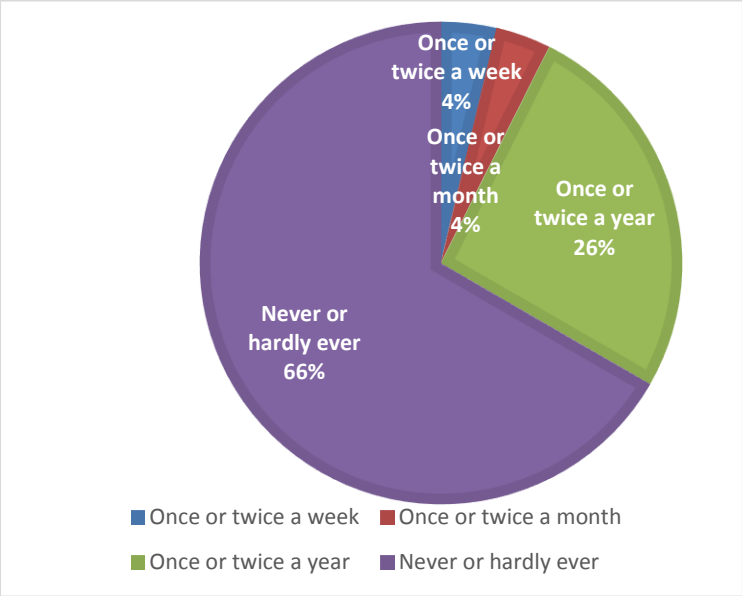
Figure 7 How often do you attend a science museum, science festival or scientific exhibition?



	Visiting science museums, festivals, exhibitions			
	Once or twice a week	Once or twice a month	Once or twice a year	Never or hardly ever
TOTAL*	0	1	22	4
BOYS	0	0	8	2
GIRLS	0	1	14	2

** 27 students answered to this question (10 boys and 17 girls)*

Figure 8 How often do you visit a research centre?



	Visiting research centers			
	Once or twice a week	Once or twice a month	Once or twice a year	Never or hardly ever
TOTAL*	1	1	7	18
BOYS	0	0	5	5
GIRLS	1	1	2	13

** 27 students answered to this question (10 boys and 17 girls)*

3) STUDENTS' INPUTS (II): FOCUS GROUP

- Students especially appreciated ECRs' involvement and engagement with them during the sessions. Their relationship with ECRs was mainly described in terms of supporting the students in the workshop tasks, by explaining the activities proposed, answering doubts about the research topic and explaining scientific concepts.
- In Terrassa, students did not clearly differentiate between the facilitators and the ECRs, although they clearly recalled the young researchers. This was especially the case in group 2 in which their referent of ECR were PERFORM facilitators.
- The sharing of expert knowledge about a scientific topic and the personal experience of doing research nowadays were identified as two main motivations of students for interacting with ECRs.
- Students in Castellbisbal expressed that they lacked more personal sharing related to the ECRs' day-to-day life and research. In Terrassa, students did not mention the sharing of personal experiences with ECRs, suggesting this might not have been a relevant aspect of their interaction.
- All students considered the topic of the PERSEIA as one of their main motivations to participate and argued that they should be given a choice, in any case. However, many of them thought it would be interesting to link their topic to the ECRs research and made different proposals.
- Students commented that their global perception about science did not change as a consequence of the project, but that it had indeed improved as the project has broaden their view about science and specially, about scientists.
- Students identified the young researchers with highly motivated and hard-working people, committed to their jobs.
- Students suggested their interaction with ECRs could be enhanced by: i) increasing the ratio of ECRs per student; ii) increasing the time within the workshops devoted to interaction with them; and iii) better matching PERSEIAs topics with ECRs research (either choosing the topics of the ECRs or bringing ECRs matching their topics).

Focus group results from INS Santa Eulàlia (Terrassa)

The interaction with ECRs has been explicitly addressed in the focus groups with participating students. Based on results from the written questionnaire, the statement "*M'hagués agradat poder interactuar més amb els investigadors i les investigadores*" was discussed with the students. Furthermore, students were asked whether the project and the possibility to interact with young researchers had changed or influenced their views of and relationship with science. Other references to researchers during their discussion were also captured for this analysis.

As a way to initiate discussion among them, students in Terrassa were asked to individually indicate with colour stickers (red, yellow and green) their degree of agreement to the statement "*M'hagués agradat poder interactuar més amb els investigadors i les investigadores*". As mentioned above, this statement got 46% of agreement in the written survey, while 37% of the students provided a neutral answer. Slightly different to the written results, 4 students indicated agreement with the statement, while 6 positioned themselves in-between. No one indicated disagreement.

However, when asked how was such interaction with ECRs during the workshops and why they would have liked (or not) to interact more with them, they seemed not to have a clear idea of **who were the ECRs**. The first people that the students mentioned were Oriol and Helena, providing answers related to them. Two girls from group B mentioned the male ECR and the female ECR in their group (in this order) and a girl from group A mentioned Sergio and the girl "whose name she cannot remember". After three interventions trying to remember her, one girl from group A mentioned the name of the ECR in this group and the rest of students seemed to remember her, except one that needed a physical description of her (spontaneously provided by another student). This student mentioned then that he remembered her but he thought "she was like Oriol". We clarified that by "young researchers" we referred to the university young researchers that were coming to the sessions, in addition to the facilitators. Half of the students described their **relationship as good**, without providing much detail beyond the ECRs being 'nice' and funny. One student mentioned that she interacted mostly with the main facilitator and another student from the same group reacted to her saying that she had contact "with everyone". In group B, three students regretted that the female researcher had to leave before finishing the workshops, suggesting some attachment with her:

> *"GIRL 218:* (The ECRs) *were very nice*
> *GIRL 206: Super good.*
> *GIRL 218: But XXX had to leave and she could not see our monologue.*
> *BOY 211: That was fucked up.*
> *GIRL 218: Yeah.*
> *GIRL 206: 'Cause she helped us so much and then... The fact that she helped us doing something that went well and that she could not see it was a bit annoying... But the rest was fine"*

References to the kind of interaction with ECRs were provided through the focus group mostly by the two students from group B that chose the same topic as the male ECR. These students described their relationship in terms of **explaining concepts and sharing scientific content**, resources and jokes for the monologues, **being 'very helpful'**. Both mentioned that they could learn from his topic of research. Actually these two students, together with another student from group B, where the only ones that could identify content that was added to their monologue thanks to the ECRs (i.e. about Nano-capsules and about the segregation of dopamine when practising sports). Three other students mentioned they had integrated contents, but two were not able to provide any example and one made reference to content suggested by Oriol (again, apparently confusing ECRs with the facilitators). There were **no specific mentions to the sharing of personal experiences** (which sometimes happened, for instance, in the gender workshop when Natalia shared her experience feeling discriminated by her PhD supervisor), suggesting this might not have been a relevant aspect of their interaction. Similarly, when asked why they thought ECRs were part of the workshops, two girls (one with the topic from Carles) answered that they were there to help.

When asked why they would have liked to interact more with ECRs, three students suggested that they **lacked time to interact** with them and one among them also mentioned that the **low number of ECRs** (2 in a group of 24 students) also hindered interaction. Another student from group B mentioned that in their small group they were quite shy to ask them, but the young researchers approached them directly and made the questions, which she found very good to foster the interaction. It suggests thus, that **ECRs proactivity helped to enhance their interaction** with students despite the low ratio and the difficulties of some of them. Within this conversation, one student commented that **interaction** was especially **difficult outside the sessions**, because it was difficult to help through Whatsapp. Several students directly agreed

with him. They argued that, even if ECRs were available to answer their questions, face-to-face contact is much more efficient because there is space for interaction and written communication is harder for them. Only one girl showed disagreement arguing that she preferred online interaction:

> *'BOY 113: But for me the worst thing was doing homework, because if you didn't know how to do it you had no help...*
> *GIRL 102: Yeah you had. You had their whatsapp dude, we had a group... They could help.*
> *BOY 113: But it's not the same. It's not the same that someone tells you something through whatsapp than...*
> *BOY 109: ...Face to face, face to face.*
> *GIRL 102: Well I think it's better through whatsapp.*
> *GIRL 218: I would have taken out homework, because we already have enough with those at school. It's true that it's not a lot but...*
> *MARÍA: You have mentioned that often in the survey. About homework and what Boy 113 was mentioning, could you ask the researchers for help?*
> *BOY 113: Yes, but it was not the same...*
> *GIRL 102: Yes, through the group.*
> *BOY 113:... In the classroom, when you ask for help you can interact.*
> *GIRL 102: Well for me it was the same.*
> *MARÍA: And why?*
> *BOY 109: Well...*
> *BOY 211: Because we might understand each other better making gestures than writting*
> *MARÍA: And you, Boy 109?*
> *Boy 109: Because it's not the same thing to read a whatsapp text than, for instance, having someone telling you the same thing face to face.*
> *(...)*
> *MARÍA: Did they answer you through whatsapp?*
> *SEVERAL (at the same time): Yeah*
> *BOY 113: Honestly, I didn't ask them many things"*

We explicitly asked the students if they would also like to **explore the topics of the ECRs**, instead of choosing a topic in their own. There was not a clearly defined position in this respect, but rather depending on the specific topic of the ECR and their scope for choice. Many students agreed that the research topic is, in general, very important for their motivation. However, four of them also commented that the decision about which topic to choose had not been a group decision but rather it had been imposed or pushed forward by one motivated person, suggesting that it would not necessarily change that much for them if the ECR proposed a topic. Two girls also suggest that the opportunities for mutual learning are enhanced if students approach the ECRs' topic:

> "*MARÍA: To which extent do you think this is important for you to be motivated: that you choose the topic or…?*
> *BOY 113: Ah….! A lot!*
> *MARÍA: ...Or if the researchers suggested topics related to their research, could they motivate you as well?*
> *BOY 113: No, it depends…*
> *GIRL 122: It depends of the topic.*

BOY 113: The best thing is that we can chose, you know? Because if we are to do research about a topic it should be one we really like.
GIRL 210: But it's also good that the can propose something, this way we could learn new things we didn't know.
GIRL 218: And they might learn from you as well.
GIRL 210; Yeah, something that you chose will always be there at your reach, but something they can show you…"

One of the two students that had chosen the topic of the ECR mentioned that it was very interesting at the beginning, but then it was harder for them to be autonomous in the search of information, because it was a very specialized topic. The second student agreed as well. One student also suggested bringing ECRs that match the profiles of the topics previously chosen by students (not necessarily one ECR per group), but he also acknowledged this could be difficult. He then suggested that ECRs could brought different topics to the class and students could choose individually according to their interest and then gather according to the topic chosen. Several students considered this proposal could work, arguing that if the topic is interesting personal differences should not matter within the group. One girl did not agree and considered difficult to work with mates they don't get on well with.

Finally, students were asked if their perceptions about science had changed with the project and three of them immediately provided answers related to their **perception of scientists**. Several students commented that their global perception about science did not change as a consequence of the project, but that it had indeed improved as the project has broaden their view about science and scientists. This generated a short conversation about science and stereotypes, and several students commented that thanks to the project they now know that scientists are also normal people and stereotypes about scientist are exaggerations. See for instance the following excerpt:

"MARÍA: Listen, this thing you are commenting about the glasses and scientists and who does science... With the workshops and the monologues, did your perception of science change at all?
GIRL 122: Yes
GIRL 210: Sure
GIRL 122: You know, the typical (scientist) that you see in the movies, with the glasses...
BOY 113: Right, when someone says 'scientist' and you think of a guy that spends 8 days within a lab, white coat and it's really crazy.
GIRL 206: I think of Einstein, but he was like that, he wore white coat and glasses.
GIRL 122: But actually, they are common people.
BOY 113: Yes, even if they explode things in the lab, it all remains the same.
GIRL 206: It's like an ideal you have in your mind, that the person is like that... It's an ideal that you have there since the very beginning, so you end up assuming it.
GIRL 122: But it's not our fault
BOY 113: It's the TV's
GIRL 122: It's the TV's, society's fault
GIRL 108: Society's."

Very interestingly, following a comment from one male student, several students identified a couple of gender aspects as being now incorporated into their views about scientists. They mentioned that women had many barriers in the past to become scientists, and that nowadays there are more women than men in science but they are not as visible as men. Furthermore,

two students were able to name three women scientists: Marie Curie, Lise Meitner and Viviane Heck.

Focus group results from IES Castellbisbal (Castellbisbal)

As a way to initiate discussion among them, students in Castellbisbal were asked to individually indicate with colour stickers (red, yellow and green) their degree of agreement to a statement reflecting students answers to the survey: "*M'hagués agradat poder interactuar més amb els investigadors i les investigadores*". Accordingly with survey results, most of the students indicated agreement with the statement (6 green stickers), while 1 was in the neutral position. No one indicated disagreement.

Students were then asked how was such interaction with ECRs during the workshops and why they would have liked to interact more with them. All students agreed that the **relationship with ECRs was good**. Such relationship was mainly described in terms of **supporting the students in the workshop tasks**, by explaining the activities proposed, answering doubts about the research topic and explaining concepts. Several students especially appreciated the **ECRs' involvement and engagement** with them during the sessions. See for instance the following quote:

'*What caught my attention the most was the involvement (of the ECRs) and how they helped us, their real willingness to approach the topic you wanted or any topic related to science… They were very responsible and attentive, it was good.*
Boy 2105, Group 1, Castellbisbal

The **sharing of both expert knowledge about a scientific topic and the personal experience** of doing research nowadays were identified as two main **motivations of students for interacting with ECRs**. As illustrated in the quote below, students suggested that ECRs' knowledge and expertise could facilitate their understanding of the research topic, by providing a first comprehensive contact with it, and also encourage them to get involved:

"MARÍA: (…) " 'I wish I could have had more interaction with the young researchers'. Here most of you agree.
GIRL 2104: Yes.
MARÍA: Why?
GIRL 2104: Because they may know more, I mean, you look for...
GIRL 2114: Sure, it's always better.
GIRL 2104: You ask them any doubt you have, you can ask them directly, and they explain it you, at least they try to make you understand and then you can look for the information at home and this way you learn more...
BOY 2109: But we are not normally with researchers and it's a good... I don't know, you are also more eager to do things, like, "oooh, we will reach her and I'll get to know her and I'll know... I don't know, it's interesting" .

Only one student disagreed and mentioned that he had not been much supported by the ECRs. When asked why, he nuanced his answer and mentioned that he was assisted when doing the activity, but he could not deepen into a research topic or into the ECR work. However, he also pointed to the fact that he was not interested in the topic of the ECR as a possible reason for not interacting much with her. He also mentioned that he **lacked more personal sharing** related to the ECRs' day-to-day life. Three other students also expressed such a willingness of more personal sharing (e.g. details about their life and what they do at work, about doing research),

which was backed up by the rest of students. Similarly, several students mentioned that one of their main motivations to interact with the ECRs was to get to know them personally, as they usually do not have contact with researchers:

'(my relationship with ECRs) was until very recently invisible. I mean, I didn't pay attention to researchers or things like that and I've started now to notice about this topic. At this point I've started to look for information, be interested and so on…'
Girl 2104, group 2, Castellbisbal

While ECRs support to the facilitation of activities seemed to have been accomplished, students perceived that more knowledge could have been shared and more personal contact with researchers could have taken place. When asked about what could be done differently to achieve this, one student commented that **more ECRs should take part of the project** (in Castellbisbal there was 1 ECR ensured per class, except two afternoon sessions in which other ECRs could come too). The rest of students agreed and some suggested bringing ECRs representing a broader diversity of scientific profiles and even, one ECR per topic chosen, to be able to better support the scientific development of the monologues.

Another student argued that she had a clear topic of interest, but it was not connected to the ECRs and thus, it would be difficult to help her. These interventions prompted the question whether they thought that ECRs should match the scientific topic chosen for the PERSEIA or whether they should choose a **topic related to the ECRs' field of research**. All students considered the topic of the PERSEIA as one of their main motivations to participate and argued that they should be given a choice, in any case. Two students argued that if students could not choose the topic, their motivation to work on it would decrease and they would probably get bored. The rest of the students agreed. However, many of them also perceived as positive the possibility to mirror ECRs' topics in their choice, because i) it could be helpful for the development of the monologues; and ii) it could bring different perspectives they had not thought about. Furthermore, one student also suggested that students should choose individually their topic (and then gather accordingly), but with some **guidelines** that could help them narrow the scientific field and be concrete, but also choose something appropriate and useful for their science understanding. Most of the students agreed with the proposal of **choosing first the topic** of interest and then making the groups. Some of them argued that it would not only increase students' motivation but also, they would be able to help each other more, because of their interest and previous knowledge of the topic. Related to the usefulness of the topic, the same student saw as a missed opportunity the lack of connection of their PERSEIA topic to the group project they have to do during the school year ('*treball de síntesi*[2]'). He suggested that facilitators could talk first with the teachers and identify different student profiles according to the scientific topics studied in their *treball de síntesi* and the school itinerary they expect to follow in the next years, so that they could **link the topics approached in the workshops to the curriculum of the school**.

Finally, regarding the image of young researchers that students' interventions suggested, most of the students identified the ECRs with highly motivated and hard-working people, committed to their jobs. Several of them elaborated a bit this image in their interventions, associating ECRs with people who enjoy their job (vocational), are perseverant and work hard. See for instance the following quotes:

[2] According to the Catalan educational law (decret 187/2015), the ***treball de síntesi*** is a set of teaching and learning activities, developed through team work, to train students' complex competences and test whether they have achieved basic competences approached through the different school subjects. It is developed in 1st, 2nd, and 3rd ESO (secondary school).

'Furthermore, they are people that are committed to their job and they like it. They explained to us everything very well and enjoyed it. Yes…(they did it) with much emotion'.
Girl 2114, group 1, Castellbisbal

'I already knew that if you want to study science you need to put a lot of effort, and with them (the ECRs) we could notice that. They seemed to have struggled a lot but also to enjoy much what they do. I think they have demonstrated us, me, that they are doing what they want, even if it takes them a lot to get there...' .
Girl 2202, group 2, Castellbisbal

Similarly, when asked about any **changes in their perception of science and scientists** after PERFORM, none of them expressed a significant change in their perception. However, most of the students stated that while their global perception had not changed, they were more aware of some issues. In this sense, one student emphasised the importance of meeting ECRs arguing that is has a true impact on them, since it is different to have an opinion about science and actually meeting real scientists and seeing directly their effort and perseverance. Several of them also commented that such impact could be enhanced if they worked on the ECRs research topic, due to the potential greater engagement of the students in the PERSEIA research process.

4) TEACHERS' INTERVIEW

Teachers' general impressions:

- Overall, the teachers were feeling positive about having had PERFORM in their school and showed their willingness to continue with the project in the future, if adapted.
- Teachers found that the workload implied by the project was ok and they expressed their willingness to have a more active role in the process. In Terrassa, the tutors of the two groups dedicated time of their own classes to support students with PERFORM homework in-between sessions.
- The involvement of the teaching body was different in the two schools. In Castellbisbal, teachers involved were mostly those directly participating in the workshops and they expressed they would have liked an overall teachers' body involvement with the project. In contrast, in Terrassa, the involvement was spread to the directing team, the tutors and other teachers, but the two main teachers directly participating in the sessions were not directly engaged before the workshops.
- Teachers identified the lack of a specific role assigned to them as a limitation hindering their involvement, during the workshops, especially in Terrassa.
- In both schools, they were receptive about repeating the workshops as long as there could be a facilitator. They also regarded a practical workshop as very useful for implementing the project in the future.

Teachers' proposals:

- The project would benefit of involving the whole body of teachers and generating a closer interaction and collaboration between facilitators and teachers, also before the workshops
- More guidance could be offered to teachers directly participating in PERFORM, through guarantying face-to-face meetings before the project, the sharing and discussion of workshop materials in advanced and the detailed discussion on how to evaluate the students (if the teacher is required to do so). They also suggested the development of a detailed teachers' guide, to orient further implementation in the schools.
- More synergies could be fostered between PERFORM sessions and teachers' lessons and school curriculum, both in terms of scientific content and students' transversal competences addressed. This would require sharing the guidelines with enough anticipation.
- More attention could be paid to diversity in the classroom, especially in schools of low socio-economic background. Collaboration with school orientation departments while designing and planning the project could foster PERFORM's attention to diversity.

Teachers interview at INS Santa Eulàlia, Terrassa

We conducted a forty-five minutes' group interview with 10 teachers (5 male and 5 female). Among them, seven teachers had been directly involved in PERFORM, either in the planning and coordination, in the workshop sessions or in supporting the students with PERFORM work. The Spanish teacher –one of the two involved throughout all the sessions, could not attend the interview. She accepted to answer an online survey instead, but at the time of the analysis she has not send her answers yet. The Catalan teacher also answered such online survey, in order to complete the answers provided in the interview.

Teachers' involvement in the project: role and workload assumed

Teachers have been **differently involved** at the INS Santa Eulàlia, according to their position in the school and presence in the workshops. Most of the session workshops were implemented during Catalan and Spanish subjects in order to facilitate the implementation of the project. Consequently, the two teachers of these subjects (one man and one woman) have been present throughout the implementation of the workshops (only 2 sessions took place in a different time slot). Four other teachers were also partially present, attending to some of the sessions or some parts of a session (i.e. the head of studies, the director, one tutor and the coordinator of informatics).

The high-school director, the head of studies, the coordinator and the informatics coordinator were actively involved before the workshops and had several meetings with Helena and Oriol to get to know the project and plan the academic year to fit PERFORM. During the interview, they seemed satisfied with these previous exchanges and the information received. Such information was also shared with other teacher staff in a face-to-face meeting in January, in which the teaching body was invited to attend, and by email. In contrast, the two teachers mainly involved in the workshops (Catalan and Spanish teachers) did not have previous contact with the facilitators. This was mainly due to a mistake in the email address of the Catalan teacher (who was not receiving any information) and to the temporary condition of the Spanish teacher, who arrived just some days before PERFORM started to do a punctual substitution.

The fact of not being properly informed was highly regretted by the Catalan teacher, who felt disconnected from the process. He expressed that he would have been more actively involved if he would have had the chance to. In this regard, he identified missing opportunities of engagement and of establishing synergies with his subject as a consequence of this lack of information and anticipation. First, he considered that the **lack of a specific role** assigned to the teachers hindered his engagement in the sessions. He felt his role was reduced to control students' behavior as he did not know how to contribute instead, and wished he could have been involved more actively. Second, he suggested that if the content of the workshops was shared with the involved teachers with **more detail and anticipation** (at least one month before the beginning), they could have profited the **synergies** between their subjects and the project. For instance, he specifically mentioned that he could have worked on students' oral expression and the development of the script in his subject, as these are competences addressed in Catalan that year. The following quote summarises these statements:

> *"As a participant teacher I arrived there and I didn't really know what I had to do. (...) Some days I was there and yes, I watched whether (the students) were doing the task, but I had no specific activity to do... (...). Therefore, I think it would be good to specify in the guidelines how could we participate more actively. If I knew exactly what was going to be approached with one month in advance, I could have worked on it during my class, like, the topic of the script, oral expression, which I'm currently working with them... I could work with them things that you would do later".*
>
> *Male teacher, group 1, Terrassa*

Third, he found his **workload** was zero as he could not prepare any materials or do any follow-up connected to his subject during the sessions. In contrast, **the tutors** of the two class groups **had both dedicated time** of their own supervision sessions and classes to PERFORM work. Most specifically, they mentioned dedicating between 2 and 3 hours to do the homework in-between sessions (e.g. writing the script, recording the videos) and to rehearse the final performance.

They did not seem to perceive this extra work as negative but rather as an implicit responsibility of the participation of the school, since, in the words of a teacher:

> "*In my group, we worked on it using the lessons of social sciences and my tutoring time and we upload (the homework) it too. Yes, we dedicated two hours to review the monologues, do a rehearsal and see what they got and record it. Then, we dedicated another class to upload them (in Moodle). (…) The problem is that otherwise, they do not meet outside highschool. I was telling them 'try to meet one afternoon, go to a cultural centre, record it…" and they said "this one is not coming, this one either… we are going to work just the two of us". Then, the solution, I miss my class and you do it well".*
>
> *Female teacher, Tutor of group 1, Terrassa.*

This would not have been possible without a flexible school framework, which suggests that the school, as an institution, had a certain margin of improvisation and was interested in the project.

Finally, the Catalan teacher also regretted the lack of coordination with him when deciding that the project would be marked as part of his subject. He found there was no guidance about how he could link students' participation in PERFORM with Catalan and suggested that this language should be present in the workshops and the monologues if the teacher is to evaluate the students for the Catalan subject. He considered crucial to ensure that the teachers that are involved during the workshops take part in the meetings held between PERFORM members and school staff. This teacher had already expressed such concerns in the intermediate meeting with the teaching body held some weeks before the end of the workshops.

The **experience and discourse of this teacher highly contrasted with the interventions of the other teachers**, like the tutors, who seemed quite engaged during the process (e.g. dedicating time of their own classes to make sure PERFORM would succeed). This suggests that the weakest point in the interaction with the school was the **early engagement of the teachers that would actually be involved** in the workshops –not only regarding their information, but also to the decision-making process, and the definition of a clear role for them to play during the sessions. In this regard, both the observations and the interview (backed up by informal conversations), suggest that there was a very motivated core group within the school - mainly represented by the directing staff, that pushed forward the project by providing institutional support and facilitating the implementation.

Teachers' willingness to continue engaged: proposals

Regarding teachers' willingness to continue implementing the project, most of the teachers were very **enthusiastic** about the possibility of **adapting PERFORM to include it in the curriculum**. The school director and the informatics coordinator mentioned that they had already talked with Helena and Oriol about the possibility of adapting PERFORM to the *treball de síntesi*[3] required in their grade (a suggestion made as well by one student in Castellbisbal during the focus group). This would imply an intensive format in which students would work in the project during a whole week (5 consecutive days, 24 hours approximately), being approached by teachers from all the different subjects. Several teachers agreed that the project would benefit of such an intensive format, since students would be more focused and involved,

[3] See definition in footnote 1, section 3) Students inputs (II): Focus Group.

and teachers would not need to dedicate extra classes to do PERFORM homework. Two teachers also commented that there might be some changes at the regional level in the educational assessment criteria that could benefit this kind of projects oriented towards working across curricular areas. Furthermore, several teachers also suggested the **development of a detailed teachers' guide**, to orient further implementation in the schools.

Similarly, they agreed that the **support of PERFORM members** (facilitators, researchers, university) would be important for them to replicate the project. In this sense, they visualized the continuity of the project as a joint venture and not to be develop in their own.

Also, the teacher in charge of the *aula d'acollida* (a specific program to integrate immigrant students recently arrived) mentioned that although she was not involved in the workshops and did not make a rigorous follow-up, she got interested at some point of the implementation. She had in her class some students participating in PERFORM and she appreciated that they were quite lost in the process. She identified the general difficulties of some of these students to follow educational activities and the school absenteeism as potential reasons. She wondered if there was any kind of **special attention to diversity** in PERFORM and suggested that more support in this regard could be beneficial. She mentioned that **collaboration with** the *aula d'acollida* or other **orientation departments** could be fostered when preparing and implementing the project.

Very interestingly, the same teacher also commented 'off-the-record' that thanks to PERFORM they had begun to have some conversations among the teachers about participatory pedagogical approaches and how could they be gradually implemented in the school. She perceived this as a very positive legacy of PERFORM, even if the project does not continue in the future.

Teachers interview at IES Castellbisbal, Castellbisbal

Three teachers were interviewed (two female and a male) out of the four teachers directly involved in the sessions. Two of them had followed the sessions with one group each (Physics & Chemistry teacher, Social Sciences teacher), while the third had participated intermittently, due to her role as studies coordinator.

Teachers' involvement in the project: role and workload assumed

When asked about their involvement, the teachers remarked that they had been involved since the beginning of the proposal to the school. They had been in touch with the facilitators from the onset, having two meetings and sharing emails and chats. Furthermore, facilitators also held a meeting with the broader group of teachers from the corresponding year that would be involved in the project (either directly or indirectly through letting students miss their classes to attend PERFORM) where they presented the project. Before each session teachers were given the information regarding that particular session, mostly via email, though sometimes the facilitators brought it printed to the school and handed it in. The male teacher remarked that they (the teachers team involved) had follow up meetings with the facilitators, and he felt confident he had been implicated.

Regarding their role, teachers' perception is that their role was 'to be there', attend the sessions 'as a general rule'. However, two of the three teachers stated that they partook in the process

above being an adult presence, they got more involved than being remely there. See for instance:

> *"Well, (I) lent a hand a bit. Sometimes I I have clarified the activity to the students, (especially when) the facilitator was busy with others"*
>
> *Female teacher group 2, Castellbisbal*

One of the teachers said that she took part in some sessions, for instance, helping with the different stations in session 2. The teacher of group 1 reported he had a big implication in the project. He remarked that he had tried to be there at each session (although he had to miss most of session 4) and that he had contributed by helping clarify information for students (for instance, guiding one of the stations in session 2), and also performing a role as interviewer, at the role-play interview in session 3.

The teachers also suggested that their involvement should be a lot wider than three or four teachers and the head of studies. They considered it should have engaged the full body of teachers for that year, not only being aware of the project but also taking part in the project through different avenues. The first one would be to be able to bring on board the teachers from language, both Catalan and Spanish. They further proposed a closer interaction between the facilitators and the teachers, involving also the design of the activities, to get the most of the experience:

> *"We would like to know from September. Just as we prepare the synthesis project, we would take this on and have it as a shared task amongst the team. Not only in terms of science or "I like this" but in terms of a shared work. Ansl also work on it with the facilitators that come from outside the school with more time, having more time to think, more hours to use for the tasks and the technical contents. This way, with a similar structure we would be able to profit from it more."*
>
> *Female teacher group 2, Castellbisbal*

Teachers also proposed that partaking in PERFORM should exempt students from some of their homework or due tasks. Otherwise students do not want to sign up for projects because they are already running a very full schedule. This could be taken into account while designing the project with the schools.

Teachers' willingness to continue engaged: proposals

All the teachers stated that they would love for these workshops to be repeated at their school, after an intense re-conceptualisation. They felt they would still need to have the input of the facilitators, as they do not see themselves facilitating these workshops:

> *"What we told the facilitators is that we need their support in order for this project to work. We do not see this project without them, a teacher daring to take on their role. So we need an external facilitator in order for this project to make sense and be successful.."*
>
> *Female teacher group 2, Castellbisbal*

When enquired about having a continuous involvement with PERFORM, the teachers did give the same advice that had been coming up throughout our interview, they advised us to improve the depth of the content and to tie it better to the school currículum (this is further analysed in GOAL 4 of WP4 results).

Furthermore, when invited to the training, the first thing that struck is that they had not heard about it before. There seemed to be a timetable clash between PERFORM training and their own school preparation for next year at the beginning of July so the teachers were uncertain about whether they would be able to attend or not. However, they said that their training needs relate to learning how to facilitate group dynamics because they are unfamiliar with the kind of dynamics that were developped during the workshops:

> *"Well I guess (training related to) group dynamics. Even if we deal with groups, in this centre we are used to a traditional teaching setting...Therefore, (training about) doing all this dynamization tasks, being able to mould a discussion and ensure there can be a debate. I think this is the part we are lacking"*
>
> *Female teacher group 2, Castellbisbal*

They also said that they would prefer a hands on workshop instead of a course itself in order to be able to put into practice the skills learned:

> *"More than a course, we would like a practical workshop. Maybe an expert explaining stuff to us but with a very practical workshop alongside it."*
>
> *Male teacher group 1, Castellbisbal*

> *"Also more theatrical aspects"*
>
> *Female teacher group 2, Castellbisbal*

5) ECR GROUP INTERVIEW

ECRs' general impressions:

- All the interviewed ECRs expressed that **they enjoyed the experience,** which they generally perceived as 'worth', and appreciated very much taking part of the project.
- As **positive aspects** of their participation in schools, they identified the possibility of directly interacting with teenagers and schools (for some of them, it was the first time), sharing their research in a different setting, learning from skilled facilitators, and contributing to a project that may have an impact in the long term in the way science is taught and learnt at schools.
- ECRs perceived they had most of the time a **facilitating role** in the workshops, supporting PERFORM facilitators in the different activities implemented (e.g. providing guidelines and making questions to the students to prompt participation, solving doubts, intervening in the plenary discussions).
- They agreed that, although there was some time scheduled at the beginning for **personal sharing**, they mostly shared technical knowledge and supported students in the activities, rather than sharing their day to day as researchers.
- ECRs generally considered that their interaction with students had a **positive impact** in fostering students' motivation and curiosity towards science, but that such impact **could be enhanced** if they could participate in a more active way (see proposals below).
- ECRs generally considered that the **use of whatsapp** did not work well and some of them expressed difficulties in engaging with this kind of technologies.
- ECRs thought that the training had contributed to critically reflect about doing research and to frame their own work, and in this sense, it was useful and needed. However, they also perceived that it lacked connection with the practical work conducted in the schools and sometimes they lacked training skills.

ECRs' proposals of improvement:

- The workshop guidelines could more clearly define ECRs' role as young researchers (more differentiated from the facilitators) and provide more spaces in the workshops for mutual sharing about science and research between the ECRs and the students.
- Such guidelines could also be jointly discussed among facilitators and ECRs with time before the workshops. Both things could help clarify ECRs' role and make more explicit what is expected from them through the process, but also to prepare some of their interventions in advance, so they could orientate them towards showing a more personal and critical perspective of science.
- The role of the ECRs could also be more clearly communicated to students in each session, so they could know what could they expect from them and take more advantage of it.
- Linking the PERSEIAS to ECRs' research topics could potentially enhance their contribution as researchers.
- Having more time for face-to-face sharing with the facilitators in-between workshops could help ECRs reflect about their interventions and better understand the process.

- A visit to one of the ECRs' research centers was suggested as a potential activity to further strengthen the relationship of students with science and between students and ECRs.

- ECRs answers also pointed to the need of better adapting the training to the practical experience of the workshops.

- More training could be delivered on the interaction with the students, covering aspects such as how to deal with students, how to motivate them –especially when they did not want to participate, or how to support them in the creative process.

Inputs from ECRs participating at INS Santa Eulàlia, Terrassa

We interviewed the 3 ECRs that participated in Terrassa, one through the group interview and two through an online survey. One of them (female, group 2) attended all the sessions and the final performance, one attended to five out of the six sessions (male, group 1), and one had to leave in the 5th session, due to a research stay abroad (female, group 1).

All the interviewed ECRs in Terrassa expressed that **they enjoyed the experience,** which they generally perceived as 'worth', and appreciated very much taking part of the project. As **positive aspects** of their participation in schools, they identified the possibility of directly interacting with teenagers and schools (for one ECR it was the first time), learning from this interaction with the students and the facilitators, and participating in a project that is meaningful for the students. Also, curiosity was one of the main drivers of their participation, both due to the methodology applied but also to the school setting, which provided learning opportunities and motivated them:

> *"I enjoyed working with the students, especially during the first session, as it broke many of my prejudices about students capacity and willingness to learn in a multicultural and « conflictive » setting. From that moment on, I was motivated to try to engage them with science by connecting with their own interests".*
>
> *Male ECR, Group 1 Terrassa*

Regarding their interaction with students, all ECRs were positive about the relationship established with the teenagers, especially the two ECRs involved in group 1. They both expressed having a **close relationship with the students**, based on mutual respect, and reported that students interacted with them very spontaneously and easily. One of them also acknowledged the important contribution of the main facilitator in generating such a comfortable atmosphere. One ECR also expressed that in those groups in which she could establish some kind of connection with the students (e.g. showing motivation about their topic or willingness to help them) their motivation to engage with her was higher and they would come spontaneously to her afterwards; while in the few groups in which she could not establish such connection, they showed less interest in interacting with her. She mentioned that the bond generated between students and them was special and it should be emphasised in the workshops, specially with those students showing less willingness to interact.

Regarding their **role**, all ECRs mostly described it as **a support to the facilitation** of the activities conducted. See for instance the following quote:

> *"We had mostly a supportive relationship with the students. A support both throughout the development of the activities scheduled, helping with the facilitation, but also as a person they could ask doubts during the creation of the monologue (…). In those groups who chose a topic not connected to mine, I think that more than supporting with knowledge (which I didn't have and I needed to inform myself as well), I could help in the organisation, in keeping*

the students motivated and try to make everyone in the group participate and no one feeling disconnected…"

Female ECR, Group 1 Terrassa

Thus, the **sharing with students** was mostly reported in terms of solving doubts and guiding the students and sometimes sharing technical knowledge about the topics. This was especially the case for one of the ECRs in group 1, whose topic of research was chosen by two of the small groups. The ECR in group 2, however, expressed having little space to share anything related to her personal experience as young researcher. She mentioned the lack of time, but also the lack of a clearly defined role as ECR and a structured integration of the researcher in the activity, as some reasons for that:

"I think (my role) was more to support the dynamic of the workshop in a way, without being part of the team that developed the workshop. So, it's like in a mid-way to do a thing. (…) It's true that for example in my group, the facilitator tried to link sometimes that I was an early career researcher, 'Oh look at XXX, she is an example...', but I think at the end the students didn't realise that I was a researcher. It was like, "mmmmmmm". And I was not doing special comments or improvements, I didn't have a special role as researcher.".

Female ECR, Group 2 Terrassa

The same ECR framed the lack of involvement of the young researchers in the discussion and preparation of the activities as a 'trade-off', since it hindered their active involvement afterwards but it also reduced the workload before the workshops. However, she suggested sharing **more detailed guidelines and with more time in advance and having a scheduled space for discussing** them in order to allow ECRs prepare their interventions in advance (and even sharing them with the facilitators to get their feedback). This could enhance also the engagement of the students with them:

"One day one student asked me: 'but do you have your own life?' And I was like 'yeah'. But I think we were not really prepared for that, because after this question I realised that I had said something that maybe if I knew before the dynamic and the possible questions, I would have prepared better. So, for me, it was a very interesting process but my problem was that I was more curious, than thinking that I was really participating or contributing in something as special guest. The idea for example of having more information about the dynamics but with more than a week, like about the whole process… I think (otherwise) is a problem to think about your role".

Female ECR, Group 2 Terrassa

The same ECR reported other difficulties to interact that dealt with knowing more clearly the participation guidelines for the students (how far to push their participation) and **lacking the skills** sometimes to support the students in the creation of the monologues.

In this regard, ECRs mentioned that the **RRI training** should be **more connected to the practical work** conducted in the workshops. They expressed that they had found the workshop valuable for reflecting about the way science is communicated and shared, and especially to foster their own critical thinking on their research. However, they found also that the training did not provide practical resources and skills needed in the workshops. See for instance the following quote:

"The training made me reflect about how science is communicated, the responsibility of science towards society, etc. And in this sense I think it was very positive to adopt a new point of view. Nonetheless, at a practical level, the training sessions did not provide me with any resourcers to improve this 'researcher – student' interaction".

Male ECR, Group 1 Terrassa

Actually, one ECR had not noticed the connection between the RRI training and the work conducted in the schools until we asked them in the interview. Although she saw the connections between some of the topics approached in the training (critical thinking, reflexivity, gender) and the topics in the workshop, she emphasised the difference between applying that concepts to reflections about their own research and facilitating a creative process with students in which such concepts are transmitted and integrated in the monologues:

"I think that the problem is that, ok we are just trying to do this exercise of critical thinking for our research, but it's not the same to be in the class with the teenagers and just to say ok we are trying to motivate their critical thinking and we don't have the tools to say 'why that is really important? how to do that?'".

Female ECR, Group 2 Terrassa

In this regard ECRs suggested to **provide resources and train skills related to students' engagement** and to fostering critical reflection, which was seen as especially relevant for those researchers that had not previously interacted with teenagers.

Furthermore, they considered that **the use of whatsapp did not work well**. Although they regarded as positive the fact of having a direct connection with students in which both students and ECRs could interact with freedom, they all identified barriers to the use of whatsapp. These barriers relate to: i) the openness of the tool, which might have hindered the participation of some students (due to shyness or peer-pressure not to show interest about science); ii) the lack of focus in whatsapp conversations, which tend to get disperse; iii) the work overload of both the students and the ECRs, which hampered engagement in an extra communication channel; and iv) the lack of use of whatsapp (in the case of one ECR). However, there were two different opinions about how this should be handled. One ECR considered that instead of removing the use of whatsapp, the interactions through this social media should be emphasised, as it is a communication channel highly used by teenagers and is the media students preferred. Another researcher suggested using the email instead, as a tool that is daily used in any work and that can provide privacy with students and the sharing of files and other media. In contrast, one ECR was especially critical with the use of such a technology and suggested taking advantage of the whatsappp to engage students in reflection too:

"It's a very interesting debate, right? Like a more ethical debate, because it's true that I don't really agree with this idea of mixing it, both lifes, professional and personal life. I was in the whatsapp, it was a kind of experiment, but if I'm reflecting about that… I prefer just to say "OK, we are not using whatsapp because..." to have this debate, as we had the debate with gender, like what happens with your personal life and your professional life?"

Female ECR, Group 2 Terrassa

The same ECR mentioned that taking into account the profile of the students (i.e. precarious socio-economic background and difficult family settings), PERFORM should focus in developing face-to-face interaction in the workshops. However, she also acknowledged that when the main

facilitator sent links to videos for the monologues, students looked at them with interest, so it could be a matter of refining the use of the tool.

Despite the identification of aspects to improve, the ECRs also expressed they found they could **contribute to the workshop**. One ECR considered she could contribute more explicitly as researcher in those workshops in which the scientific method was approached. However, they generally considered that their contribution was mainly in transmitting the **appetite for doing science and the motivation** to participate. In this regard, they considered that the contact between ECRs and students was, indeed, fostering students' motivation towards science:

> *"I think that (the interaction with ECRs) mainly helps to motivate those students who have a laten interest towards STEM and besides, it breaks with the stereotype of "lab freak" of the rest of the students, who, in addittion, learn new things"*
>
> *Male ECR, Group 1 Terrassa*

> *"Right from the very first day, the day we introduced ourselves as researchers working in different scientific fields, my feeling was that the pupils showed a special interest towards knowing more about what we did. I think it is important that the pupils (…) get to know young researchers that could be just like them. To demystify it a bit, to bring them closer (to science) and transmit the motivation for developing a scientific project"*
>
> *Female ECR, Group 1 Terrassa*

Because of this, they also suggested fostering more such interaction through the workshops and emphasise it in front of the students as well:

> *"I think facilitators should insist more the students on the fact that we, the researchers, are there to help them in the creation of the monologue, especially during the first moments in which they have to search for information and contrast it (…). It is important that students do not see us as a another facilitator or like a teacher that comes to lecture them, but as someone close to them, like another help tool".*
>
> Female ECR, Group 1 Terrassa

Inputs from ECRs participating at IES Castellbisbal, Castellbisbal

We interviewed 4 of the 6 ECRs participating in Castellbisbal[4], two through the group interview and two through an online survey. Among them, two female ECRs had attended the workshops through the whole process (one in group 1 and the other in group 2) and two male ECRs had participated punctually in two sessions in the afternoon (idem).

All the 4 interviewed ECRs (out of 6 participating) expressed that **they enjoyed the experience,** which they generally perceived as 'worth', and appreciated very much taking part of the project. As positive aspects of their participation, they identified the possibility of directly interacting with teenagers and schools (for two of them it was the first time), sharing their research in a different setting and contributing to a project that may have an impact in the long term in the ways science is taught and learnt at schools. Two ECRs mentioned learning a lot from Helena and Oriol's facilitation and communication skills and all of them appreciated their support and personal contact through the process. One ECR also expressed that he had ratified through the

[4] There were also two other ECRs that attended punctually to two sessions to substitute the ECR in group 1.

workshops the value of scientific monologues and performative conferences and that he would like to use them in his thesis research as well.

One ECR also mentioned that the experience was more enjoyable during the first sessions, as she perceived students in her group were more motivated, although seeing some students achieving their goal at the end was rewarding too:

> '*It was very good. In general, I really, really enjoyed it. Especially the first days that perhaps the students were more engaged (…), they were very happy receiving our propositions of debate and everything like that. But once they had to start to work in their own things, it changed a bit. So, it was not as easy for us also to feel engaged with the students and to be able to participate, because they were not feeling it, so we had to put a lot more effort. Anyway, the last day that they did some monologues we were quite surprised because other students that we did not expect that they were gonna be so engaged and motivated they were and it was, really... I don't know, rewarding kind of? It was worth. Insisting so much week after week... So, I really liked it*'.
>
> Female ECR, Group 2, Castellbisbal

In both groups, all ECRs agreed that their presence was very positively received by the students and they had a relaxed relationship with them. The ECR attending Group 1, highlighted that she was the one leading dialogue because students were quite shy:

> *"I think they were confident to comment with me anything they needed, even if the relationship was always a bit shy and from the role student-teacher. It was me who initiated the conversation or made questions to them, although the conversation among them was not constrained by my presence. The fact of (me) being there motivated them to concentrate in their work"*
>
> Female ECR, Group 1, Castellbisbal

She also mentioned, though, that she perceived a small change in students through the sessions, observing them more comfortable and less shy in their interaction with her.

Generally, it was easier for ECRs to interact within students' small groups than with the whole group because students generally seemed to feel more comfortable asking questions in small groups, with less peer-pressure and more time, and to better understand ECRs' role in this kind of setting, as ECRs answered their questions and helped them with the monologues. Also, one of the ECRs that could only attend two sessions mentioned he felt sometimes constrained in the interactions because he was a bit out of context.

All the ECRs agreed that, although there was some time scheduled at the beginning for **personal sharing**, they mostly shared technical knowledge and supported students in the activities, rather than sharing their day to day as researchers. They appreciated having time to introduce themselves but they felt they would have needed more time to share what it means for them to do research.

In this regard, all ECRs agreed that they had a facilitating role in the workshops, supporting PERFORM facilitators in the different activities implemented (e.g. providing guidelines and making questions to the students to prompt participation, solving doubts, intervening in the plenary discussions). Such a role was not necessarily related to being a researcher, as suggested (explicitly or implicitly) by ECRs answers. See for instance:

"(...) In the critical thinking session or in the gender stereotypes (session), for example... Well, I have my ideology in feminism and I could apply that. Not because I'm a scientist, but because I'm a person that has been reading and has opinions about things. So, I think if I were not a scientist I could have helped anyway, in the same ways I did".

Female ECR Group 2, Castellbisbal

One ECR mentioned that he would have now changed his introduction to make it more personal and suggested that adding more spaces for personal sharing in the workshops could enhance students' engagement with the ECRs:

"It's true that they saw us, "ok we are normal people, we speak with normal language…", but there were no personal questions. For example, they did not know if I have free weekends or not, what I do, if I have money to buy a house or not... Something like that. Like "it's true, they are scientists, they are real, but what they are doing… I have no idea". So, it could be nice also to put a bit of personal life. So, it's a normal profession, it's not only the crazy genius with white coat always closed in the lab".

Male ECR Group 2, Castellbisbal

In this regard, both ECRs perceived that the openness of the initial sessions and the general approach to some scientific facilitated more their involvement as researchers, while their role was clearly facilitation-oriented in the last ones, which focused on creating the PERSEIAs. One of them also felt that the fact of not choosing their topic constrained his contribution in these last sessions and suggested linking the PERSEIAS to ECRs' research topics to enhance their potential contribution as researchers:

"Maybe it could be a good idea to try to link the topics of the school with topics in our research to try to at least to have something to add in the last sessions, because if not, it is difficult (to contribute)... You cannot put scientific questions on the table, but you cannot either control the dynamics. So maybe if you try to find the correct scientist for a concrete group, maybe it could be easier for us".

Male ECR Group 2, Castellbisbal

Other ECRs' interventions also pointed to the role defined in the workshop guidelines, which was more oriented towards supporting facilitation, than towards providing spaces for mutual sharing about science and research between the ECRs and the students. One of the ECRs also pointed to a lack of clarity in their role as researcher by mentioning that students did not seem to clearly differentiate the roles between the facilitators and the ECRs:

"Sometimes students asked me doubts or made comments of things not related to the activity we were doing, like how to deliver homework, something I could not answer. It called my attention because I had the impression that they could not really distinguish between the facilitators and the researchers, at least at this level".

Female ECR Group 1, Castellbisbal

Another ECR also commented that she lacked procedural and context information that could define her role more clearly and guide her in the facilitation (some sort of interaction guidelines according to PERFORM's purposes and values):

"Also, I would like to know what to do when a teenager says 'No, I'm not doing anything, I don't care. Like sometimes I didn't know how far could I push this person to do something, because in my mind, if I was alone, I would be like "What?! You don't want to do that? We came all the way here to teach you science and you dont want to do this?!". But of course, you cannot do that, you have to respect everybody's decisions, so... I don't know, a bit more of knowing how far do we have to take our role".

Female ECR Group 2, Castellbisbal

Although such a lack of clarity in the guidelines was sometimes positively received by ECRs, as it reduced workload for them at home and made it easier to participate in the project, they perceived that it generally hindered their involvement. ECRs made several **suggestions to enhance their engagement** in the process. They suggested that: i) the guidelines could define a **more differentiated role as ECRs**; and ii) they could be **jointly discussed** among facilitators and ECRs with time before the workshops. Both things could allow to clarify ECRs' role and make more explicit what is expected from them through the process, but also to **prepare some of their interventions in advance**, so they could orientate them towards showing a more personal and critical perspective of science. Related to this, having more time for **face-to-face sharing** with the facilitators in-between workshops could help them reflect about their interventions and better understand the process. Furthermore, Finally, two ECRs also suggested trying to fix the **same timetable** for all the sessions (something that was not possible in Castellbisbal), so that it would be easier for the ECRs to organise their agenda and also for the students to know when they have PERFORM. One ECR also suggested that **teachers** should be **more engaged** too and properly understand the values and aim of PERFORM, since she perceived that, in her group, teachers' interventions were sometimes too hard on students and influenced the relaxed atmosphere created by the facilitators.

Despite the perceived lack of a clear role as young researchers, **ECRs perceived they could still contribute to the workshops** by fostering students' curiosity about and motivation to do science and breaking stereotypes about scientists through being there and interacting:

"They asked me some personal questions, like "how many years you have for this project? And do you work everyday? Where do you work?" And some things like that, it was nice. But I think that also the fact of being there and looking how we look, like being a young woman and being there, I think that's a lot already (…) to think we are not crazy scientists, just normal people in the street. Yes, just breaking stereotypes and breaking the myth, and speaking to them face-to-face."

Female ECR Group 2, Castellbisbal

Two ECRs also referred to fostering students' critical thinking by making questions to them and prompting their reflections in small groups through an empathic contact with them:

"I think that our contribution was like empathy with the students, like 'we are here, ask whatever don't be shy, we are not gonna mark you or anything...'. And then critical thinking, like 'why are you saying this? Are you saying this because you really believe it or because you have read here that they say that this is true...?'. Like to give a counterpart to what they are saying, kind of".

Female ECR Group 2, Castellbisbal

Also, one of the ECRs, whose PhD is related to theatrical studies, mentioned contributing as well with suggestions to the structure and dramaturgy of the monologues and to students' acting.

ECRs answers also pointed to the need of better **adapting the training to the practical experience of the workshops**. In this regard, ECRs mentioned that the training had contributed to critically reflect about doing research and to frame their own work, and in this sense, it was useful and needed. However, two of them also perceived that it lacked connection with the practical work conducted in the schools. One of these ECRs mentioned he felt he lacked some facilitation skills and the other ECR mentioned she needed to build upon her facilitation skills acquired as scout leader and her own theatrical training. They both would have appreciated more training on the interaction with the students (e.g. how to treat them, how to motivate them –especially when they did not want to participate, how to support them in the creative process), as they felt that there are many steps between reflecting about your own RRI practice and transmitting RRI values to students that were missing in the training. One of them also acknowledged that learning facilitation skills with children and teenagers is not a matter of two sessions of training, but something you also need to support with a lot of practice.

ECRs also reflected about the use of **social media in PERFORM**. Only one of the ECRs involved in Castellbisbal was included in the whatsapp group, still three of them perceived it had not worked very well. They identified as main reasons: i) the general difficulty to engage students beyond the workshops face-to-face sharing (mostly due to the lack of time at home) and ii) the openness and lack of privacy of whatsapp, in which everyone is involved in the conversation, which could have hindered the participation of some students as well as disperse the focus of the conversation:

> *"I think that when you start demanding something that goes further of what they can do there, they don't feel engaged enough. Like in Whatsapp they only said, "today I'm not coming because I have to go somewhere", that's the only thing they said in the whatsapp. At first, they started to put some jokes but they did not continue. Yeah, I don't think it worked."*
>
> Female ECR Group 2, Castellbisbal

Two ECRs also explicitly expressed not having much relation with social media and both also suggested having some resistance to use them, either due to an ethical conflict in using this kind of technologies with children or to the willingness to separate their private and professional life:

> *"And also when you suggested in the guidelines that we could use Instagram and Facebook and all those things… Well I don't have any of those, so I was like, what I'm supposed to do to communicate with the kids this way...?"*
>
> Female ECR Group 2, Castellbisbal

> *"I didn't participate in whatsapp, but for me it would be a problem to mix the personal life with the professional life. I don't know if it's correct that the kids use whatsapp to send jokes to their friends and then (use it) to ask them about science. So, I don't know, maybe it is necessary to separate both aspects*."
>
> Male ECR Group 2, Castellbisbal

They did not identify, however, an alternative communication channel with students out of school. Still, one ECR mentioned the positive influence in students of the two meals organised

together and suggested they could be an additional way of gathering students for sharing beyond the workshops.

All in all, the participating ECRs generally considered that their interaction with students had a **positive impact in the "right direction**" (fostering students' motivation and curiosity towards science), but that it **could be enhanced if they could participate in a more active way**. They also appreciated the learning experience and the workshops, as a way of stepping out of their own daily practice and entering a different science communication setting (high-schools and teenagers). Also, the interaction with students seemed to foster ECRs reflections as well:

> *"I could see the work dynamics of students this age, something I'm not used to, and therefore, it has been a very positive learning experience for me. Especially when I had to explain something to them or motivate them to work. I think this has also allowed me to better reflect about the topics we were approaching".*
>
> Female ECR Group 1, Castellbisbal

6) METHODOLOGICAL ANNEX

WP4 methodological approach and evaluation target

We have implemented a mix methods approach, combining different qualitative and quantitative data collection methods, data sources and analysis strategies (triangulation). These have been applied during different moments of implementation of the project: before, during and after the PERSEIAS participatory process.

This document contains data gathered from the different actors involved in the PERSEIA (secondary school students, their teachers and early career researchers), through specific assessment methods: observations of the workshops, two written surveys to participating students, one focus group with students, one online survey to the teachers, and one group interview with ECR. Table 1 summarises these methods and their focus of our analysis in relation to Goal 1.

We have conducted a descriptive statistical analysis of students written surveys using the statistical software Stata. We analysed students' answers by looking at the frequency of each score (from 1 to 7 in the Likert items; and according to frequency categories in Q2) for the whole sample of students. We have then analysed responses according to sex.

For the rest of the assessment methods, we have conducted a qualitative analysis. Most specifically we have conducted a conventional content analysis. Content analysis was chosen among the different analysis traditions as it helped us explore participants' answers in detail and identify themes, patterns and meanings related both to the contents addressed and participants' experience of the workshops. The analysis was supported by the software Atlas.ti and guided by a list of key dimensions and topics related to Goal 1 (see Table 1) which allowed as to identify emergent codes and categories of analysis.

Table 1. Assessment methods applied, general objectives and connection to the analysis of GOAL 1.

Assessment method applied	**General objectives**	**Target**	**Focus of our analysis in this document (items included for analysis of GOAL 1)**
Observation (Group 1 was observed throughout all the sessions, while group 2 was observed in sessions 1, 3 and 6)	Examine the PERSEIA participatory process as it happens and track group processes and RRI requirements during the sessions (e.g., group decision-making, students' inclusivity and participation, engagement, attitudes)	Students ECR Teachers	Inclusion of ECR personal stories Role of the ECRs involved and interaction with students Role of the teachers involved and interaction with students Interactions between ECR, teachers and facilitators Impressions shared by teachers and ECR after the session (if any)
Written surveys Pre- PERSEIA (Terrassa, n= 44; Castellbisbal, n= 27) Post-PERSEIA (Terrassa, n= 37; Castellbisbal, n= 22)	Obtain basic demographic data Explore initial attitudes and perceptions towards science and STEM careers, with an emphasis on RRI-related dimensions, and potential changes after the implementation of PERSEIAS Explore participants' perceptions towards the PERSEIAS process	Secondary school students	Survey pre-PERSEIA: Q2 *How often do you do these things?* d) Attend a science museum, science festival or scientific exhibition, for instance e) Visit a research centre (for instance, within a university) Survey post-PERSEIA: *Post LIKERTQ5: I wish I could have had more interaction with the researchers during the workshops (names)* *Post LIKERT Q4: During the workshops the teachers helped us doing the tasks*
Focus Group (Terrassa, n= 10; Castellbisbal, n= 8)	Explore in-depth the impact of PERSEIAS and its RRI approach in students' transversal competences, attitudes towards science and STEM	Secondary school students	Students perceptions of the interaction with ECR in the workshops: Reaction to the statement: *I wish I could have had more interaction with the researchers during the workshops (names)* Discussion: Why? How was the interaction with ECRs? Who did you interact with? What have you learned from them? What was the dynamic?

	Explore participants' perceptions towards the PERSEIAS process in terms of their own learning and experience.		Influence of the interaction with ECR in students' perceptions of science: Has your relation to science or you perception of science changed in any way through your participation in PERFORM? Why and how? (check mentions to ECR when sharing their perception of science after PERFORM) Did the interaction with young researchers influenced at all in this?
Group interview (Terrassa, n= 10; Castellbisbal, n= 3) Written online survey (Terrassa, n= 1)	Explore teachers' perceptions about the PERSEIA participatory process, including: their involvement in the process, students' attitudinal changes and improvement in transversal competences, and willingness to continue implementing the project.	Secondary school teachers	Questions about their role and engagement: *What has been your role throughout the process and what workload has it generated?* *Would you have been more involved if you had had the chance to? How?* *Would you like to repeat these workshops in your school on your own?* *Are you interested in maintaining your involvement with PERFORM (e.g. attending a forthcoming teachers' training, giving advice on new activities, etc.)*
Group interview (Terrassa & Castellbisbal n=3); Written online survey (Terrassa n= 2; Castellbisbal n= 2))	Explore ECRs' perceptions about the PERSEIA participatory process, including their involvement and the interaction with students.	ECR	Reflection session conducted by WP3 researchers. Interventions related to: *ECR interaction and relationship with the students* *ECR role during the sessions* *Training needs to foster their relation with students*