

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

**Results of French case study**

This document provides a preliminary analysis of the data collected through the workshops in France 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**

- 0. General information and highlights of the results and analysis**
- 1. Observations during the workshops**
- 2. Students inputs (I): written survey**
- 3. Students inputs (II): focus group**
- 4. Teachers interview**
- 5. ECR written interview**
- 6. Methodological Annex**

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

### **Results of FRENCH case study**

#### **GENERAL INFORMATION:**

**Schools:** Collège Les Toupets (Vauréal); Collège Marie Curie (Paris 18<sup>ème</sup>).

**Participants:**

-**Collège Les Toupets:** 25 students distributed in two different groups of 11 and 14 students, each of them supported by 2 PERFORM facilitators (including 1 professional of performing arts), at least 1 teacher and 1 ECR, respectively.

- **Collège Marie Curie:** 24 students distributed in two different groups of 12 students, each of them supported by 2 PERFORM facilitators (including 1 professional of performing arts), at least 1 teacher and 1 ECR, respectively.

**Setting:** 7 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 for students from Collège Les Toupets that took place in the local theater.

#### **HIGHLIGHTS OF THE RESULTS AND ANALYSIS**

- Inputs from the different actors involved suggest that the interaction between students, ECR and teachers has not reached its full potential despite most participants' appreciative stance towards the project. Such interaction could be fostered through a greater engagement of ECR 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 logistical support for the development of the workshops and some of them provided punctual support to the facilitation in the activities. They pointed to the lack of a specific role assigned as a limitation sometimes hindering their involvement during the workshops, especially in Vauréal.
- Teachers found the workload generated by the project as compatible with their work. In both schools, teachers dedicated time of their own classes to support students with PERFORM homework and rehearsal in-between sessions.
- ECR were quite unsatisfied by their experience with the project. They all reported the lack of previous preparation and communication with facilitators for the establishment of the workshops and the impression of feeling uselessness.
- ECR mainly adopted a passive role during the workshops and most of them quitted early in the process. Students appreciated ECR's involvement and engagement with them during the sessions. However, some of them expressed that they lacked more

personal sharing related to the ECR's day-to-day life and research. Many of them reported they wish they had had more interaction during the workshops. Similarly, ECR perceived their role was not clearly defined and missed having more opportunities to interact with the students. They considered that their interaction with students did not reach any impact in fostering students' motivation and curiosity towards science.

*Proposals of improvement:*

- Students suggested their interaction with ECR could be enhanced by: i) increasing the time within the workshops devoted to interaction with them and to have a continuity of ECR's presence; ii) organizing visits to research centers or museum; and iii) make intervene different scientists from different backgrounds and different ages, iv) to perform in front of researchers as a tool for debating about science and scientists.
- 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.
- The workshop guidelines could define more clearly ECR's role as young researchers and provide more spaces in the workshops for mutual sharing about science and research between the ECR and the students. Such guidelines could also be jointly discussed among facilitators and ECR with time before the workshops. Both things could help clarify ECR's 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 ECR's research topics could potentially enhance their contribution as researchers and increase their interaction with students, with the attention that if the questions developed for the PERSEIA are more related to ECR's topic, they should be intimately linked to students' and adolescents' interests in order to motivate them.

These highlights provide a global view of the data collected from the different actors involved through the workshops (students, ECR and teachers). The following sections provide more detailed information, organized 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 they mostly provided logistical support to their implementation. Their attitude has been mostly that of engaged observers, with a varying degree of involvement depending on the teacher; and carrying the role of authority toward students.
- Teachers provided punctual support to the facilitation in some activities, but most of them supported the project outside the workshops, both helping students in their research and rehearsing before the final PERSEIA. They also provided logistical support to WP4 tasks before and after the workshops, by managing the implementation of PRE and POST surveys with students.
- Students' relation with teachers was mostly respectful and students did not seem to be disturbed by teachers' presence. However, it varied according to the teachers and students, as some situations of tension occurred, specifically in Marie Curie. These situations impacted the development of some workshops and were in discordance with the pedagogical approach of Perform facilitators.
- Most ECR left the project early in the process.
- The ECR had a few chances for introducing their research and their experience, through the presentation of their research the first day, and their participation in the group discussions a few times.
- Thus, ECR were generally passive during the sessions they attended. Only one ECR could get involved in the process of sharing experiences with students when they were working on their own questions, as students' topic related to her research discipline.
- Students relation with the ECR was respectful and horizontal, but students' reactions to ECR sharing and presence varied according to the group. Only some students were active, asking questions and trying to share with the ECR.

The following subsections provide detailed information on the observations gathered in both schools: Collège Les Toupets and Collège Marie Curie. 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 Collège Les Toupets (Vauréal)*

#### ***Involvement of the teachers and interaction with students***

In total, **five teachers** followed the process of Perform (between two and three in each students' group) and they were present mostly one by one, but sometimes together. They were all women, from different backgrounds (e.g. French, Physics, and Mathematics). One teacher who was present since the beginning of the project and with a background in performing arts left the project after the second workshop (maternity leave) and was replaced

by another one. Only one teacher out of the remaining four had experience with performing arts.

In both groups, during most of the workshops, the **teachers were quiet, sat in a corner of the room, and did not actively participate in the activities**. They were, however, present and attentive and **intervened punctually** in order to ask for concentration and silence. This occurred mostly during the first sessions (PW1, 2 and 3), and afterwards they did not intervene that much, the leader's role being carried by both facilitators.

**Sometimes, they did not assist to the whole session** (it occurred specifically during 2 workshops). Despite of their reduced participation during the workshop, they did intervene sometimes, visiting students when they were performing tasks in small groups, in order to follow their involvement and to help them. They also **supported some specific needs of students when situations occurred**, as for instance, in Group 1 when a girl got really nervous during one workshop and did not want to participate in the activity anymore, the teacher took time to look at and assist this student.

Teachers' role was mostly related to **maintain and adapt the atmosphere for the development of the workshops**, by asking for instance for silence and concentration among students when they were distracted and began to be more disperse. Teachers were also highly involved in the **management of logistical aspects** related to the workshops, to both facilitate access to the workshop rooms and join the Perform students. Many times the workshops began late as they were arriving late to the rooms, because keys, or students, were missing. During the fifth workshop a vast majority of students were absent and both groups rehearsed together in a single room. Teachers spent almost the whole session trying to find the missing students all around the school and calling the different representative (parents) of these students.

**Students did not seem to be affected by presence of the teachers**, as they were behaving the same way with or without teachers' presence. They were respectful with the teachers and their dialogues were relaxed and fluent. At the beginning of the project, in Group 1, when students were performing activities in subgroups (e.g. activities about societal challenges and critical thinking), the teacher was walking around the room, approaching the different tables in order to help students if needed. As students were mostly asking her issues related to their lessons or homework related to teachers' classes, she preferred not to disturb them and stayed mostly further from the tables. Then, after the development of some workshops, students' relation with the teacher changed and they started to share things related to the workshops and not so much related to classes or lessons.

**Teachers' participation became higher at the end of the process**. They did provide an impactful help to students at the end, when students were already performing and rehearsing their scenes. During the last sessions, when students were creating and performing their PERSEIA, the teachers present intervened in an enthusiastic, encouraging and constructive way, by giving feedbacks to students' performance and sharing ideas.

Finally, the **day of the performance**, the four different teachers organized all the logistical aspects for bringing students (PERFORM and audience) to the theater. They were attentive and accompanied students from Perform, investing time and energy to support facilitators by making this event special. To close the PERSEIA process and celebrate it, they brought food and drinks that were shared between all the students and members of the project.

### ***Involvement of the ECR and interaction with students***

**Two ECR** were involved in the Collège les Toupets, one man and one woman. They attended to some of the first workshops but left the project early in the process. The man left it after the third workshop (he participated in two workshops) and the woman after the fourth (she was present in three). See *“ECR training in FR – intermediate mentoring session feedback to leaders of WP2, WP3, research team & project coordinator by AJA”*, sent to the consortium on March, the 6<sup>th</sup>.

In general, the **involvement and participation of the ECR was really reduced**. They were mostly **inactive** and only participated **actively in PW1 (Societal Challenges) and PW3 (Critical Thinking)** (as it was thought and established in the protocol of both workshops previously).

During these two workshops, in the Group 1, the ECR got involved **presenting his background and research during ten minutes during PW1**, and **led a table on an article during the PW3**. This article related to his research topic, which was not the case for the ECR in Group 2. During this activity, he directly interacted with subgroups of students during 10 - 15 minutes in each group. He asked students to read the article and proposed a calculation he wrote on the whiteboard for illustrating the problem brought by the situation described in the article, which students tried to solve. Among the different subgroups, **students were mostly quiet and did not react that much**. The ECR asked the respective questions related to the article and students were giving few answers.

However, he also **participated spontaneously in other settings**, such as when subgroups of students were presenting the results of their project in front the entire group during PW1, and during the debate, when students were asked to do a synthesis on what they had learnt from the different stations/table during PW3. At these moments, the **ECR was asking students to further develop their ideas**, helped them in their thinking and tried to bring relevant elements in order to develop their critical thinking. However, **students' reactions to his comments were low** and **ECR-students interaction seemed not to reach a mutual understanding**.

In this line, in general, students paid attention and seemed interested by ECR's topic. However, their attitude varied between groups. In Group 1, students' concentration **was low** when the ECR presented his research during PW1 (three students were not looking at him) and **none of the students asked any questions**. During the debate/sharing of the PW3, when the ECR was asking them questions, it appeared **quite difficult for the students to interact**, as they could not really answer to his questions or comments. When talking with them, he also had an authoritarian way of talking, by looking offended when a student was interrupting him. Students were more or less concentrated when he was talking, showing a lack of interest toward ECR talks.

Although the ECR was attentive to students when interacting and supported them punctually (especially when one of them was apparently sick), most of the time during the workshops he was isolated and sat in a corner, looking at his Ipad (what he also did when leading one of the stations).

In **Group 2**, the involvement of the ECR was similar to the one described above, following the protocol of the workshops. However, she was **more involved**, as she spontaneously went through the different subgroups when they were doing the activities in order to help them. The interaction with students was horizontal and relaxed. However, as it was the case in Group 1, she was also mostly inactive during the workshops.

***Involvement of the teachers and interaction with students***

**Two teachers**, both women, followed the process of Perform, one teaching Physics and Chemistry (4 workshops) and the other French (7 workshops). This latter had previous experience in theatre and performing arts.

Similar to Vauréal situation, teachers were **carrying logistical aspects**, by looking for students before the workshops and when they were missing. However, in contrast with the other school, it occurred some times that **students were not aware** they had session with Perform the same day, which had an **impact on both the punctuality of the students and the timeline of the workshops**, but also on their **general motivation during the sessions**.

Because one teacher was absent during several workshops, the other one, present the whole time, **had to shift between both groups when her colleague was absent**. In this sense, the presence of both teachers was really reduced during the workshops.

Overall, when present in the workshop, the teachers carried mostly a **role of authority** during the workshops, by being present in the room as an observer and intervening to keep the calm, or when there were issues with some students. Some **challenging situations occurred** during the workshops, mostly related to some students who did not want to participate to the project, more specifically with three of them. In Group 1, during the PW3, a student who was not part of the group (Group 2) suddenly entered into the room, apparently really annoyed. He said quickly hello and went directly to sit on an empty chair while the other students of the group were sharing ideas and opinions with the facilitators about the future scenes to create. The teacher entered into the room and began to scream to this student, asking him to stay calm and not to disturb the others. He was really impulsive, saying he did not want to participate. The whole group kept quiet. Both facilitators took time for silence, waiting for him to calm down, and came back to the previous sharing they had with the students. Once the teacher left the room, they could share more with this student, taking time out of the room to talk with him, what allowed the activity to follow. This student progressively took part of the activities and was then active in the discussion and sharing with the others, without being conflictive with the facilitators, but this atmosphere of tension stayed during a long while.

Similar to this punctual really disturbing event, others less impacting also occurred in Group 2, as two other students who were part of this group did not want to participate. Even if their unwillingness to get involved in the workshop did not reach to such conflictive situation, it challenged the pedagogical approach of both facilitators from Group 2. Indeed the teacher was interacting with these students, taking decisions about the way they would or not behave in the workshops, without any concordance with both facilitators. In the same line, it was only late during the project that facilitators got aware that both students did not want to participate since the beginning of the workshops, when the teachers told them. In this sense, the way teacher handled with conflictive situations somehow **struggled the proceeding of the activities and a pedagogical coherence with PERFORM members**.

Therefore, **students' relation with teachers largely varied according to the students**. Except these punctual tensions between some students and teachers, **students interacted overall respectfully with the teachers** and did not show any clear difference in their behavior when the teacher was or not present during the workshop.

Finally, teachers almost **never participated to any of the activities** proposed during the workshop. They **intervened very few times** during the workshops to help students when they

had some specific questions, or to support them when some students faced some personal issues (being sick or anxious). During the last sessions of the workshops, they were directly asked by the facilitators to provide some help to the students, or to get more involved in the activity proposed. In Group 1, the facilitator asked the teacher to help students belonging to the subgroup working topics related to sociological questions. As they created a questionnaire they wanted to conduct among their colleagues in the school, the facilitator asked the teachers to copy the questions and to help students to conduct this questionnaire, outside the workshops. The teacher directly showed her agreement and desire to help; what she did the days after. In the other Group, the teacher was asked once to participate with students to the warming up activity, what she also did.

### ***Involvement of the ECR and interaction with students***

**Two ECR** were involved in the Collège Marie Curie, two women. Both attended four workshops (more than the ECR in Vauréal), but only one ECR was present in the final PERSEIA.

In general, similar to what happened in Vauréal, their **involvement and participation was reduced to two interventions**: the first one to present their own research (PW1) and the other to lead a table about an article (PW3, Critical Thinking). In that sense, their active involvement and interaction with the students as thought by the design of the protocols, was limited to an official ten-fifteen minutes presentation and ten minutes by subgroup during PW3. However, in contrast with Vauréal, both ECR generally got more involved (because they attended more workshops) in a spontaneous way during students' activities. They participated to the warming up with students and were part of students' small groups.

However, **ECR's involvement differed between groups**, mostly because students from Group 1 chose questions related to sociology, the ECR discipline, which was not the case in Group 2. Thanks to that, the ECR involved in Group 1 could participate more and took time with the group of students interested by sociological issues, in order to help them in the implementation of their own research. She accompanied these students to further develop their own questions and to create a survey protocol to conduct with other students from their school. Then, she also helped them to analyze the results, when the surveys were already collected.

In general, in both groups, **students seemed to be interested and attentive** when the ECR were presenting their works and asked them questions. In Group 1, despite of the classical way the ECR presented her research; echoing the adult-young interaction during teaching classes, with the adult presenting in the whiteboard and students sitting and listening to the adult, dialogue was fluent and students asked many different questions. Their attention was notable and it could be seen afterwards, as they were able to remember in next workshops anecdotes and concrete examples of the key notions the ECR presented when explaining the sociological approach.

This ECR also attended the two last workshops before the rehearsal. During these workshops, students' interest toward what she was explaining was even higher. During the analysis of the results, students were really curious of the results themselves, but also really attentive to ECR's comments. Moreover, she also intervened punctually when looking at the rehearsal of the scene and was making comments and encouraging students, giving them feedback on their performance. At these moments, they were also attentive and interested by her interventions.

In **Group 2**, the **ECR's involvement was lower**, as students did not chose any subject related to her research topic. However, she participated in the activities, involving herself in the warming



up activities and was active for helping the students in the process of research during the workshops. For instance, she spontaneously intervened during the round of research questions, and provided information to several of the questions and gave tips to the students. She interacted with students in a quite horizontal way, e.g. she reacted to their interventions without trying to put some order or norms and she approached students in a very relaxed way, and students listened to her carefully. When she attended the final performance, students showed their happiness and satisfaction to have her in the room for the PERSEIA.

## 1) STUDENTS' INPUTS (I): WRITTEN SURVEYS

- Students showed contrasting perceptions about the support of their teachers depending on the school. While in Vauréal 2/3 of the students considered that teachers had supported them, in Marie Curie only 1/3 of the students agreed with this statement and a third of them provided a negative answer.
- Between 63% and 53% of the students (in Vauréal and Marie Curie, respectively) reported that they wished they had had more interaction with young researchers. However, in Marie Curie 1/3 of the students also reported a neutral answer to this issue (no agreement or disagreement), a higher proportion than in Vauréal.
- Students do not seem to have often opportunities to interact directly either in scientific contexts (such as museums) or with scientists, as most of them reported visiting museums at maximum only once or twice a year, and to never have visited research center. However, students from Marie Curie reported a higher frequency of visits to science museums, what could be partially explained by the localization of the school (in the center of Paris).

We analyzed students' degree of agreement to two statements in the post-PERSEIA survey related to their interaction with the teachers (*"During the workshops, the teachers helped us doing the tasks"*) and their interaction with the ECR (*"I wish I could have had more interaction with the young researchers (names in each school)"*). Twenty-five students (14 girls and 11 boys) answered to the questionnaire post-PERSEIA. We also tested if such different perceptions about the interaction with ECR are related to the students' previous contact with science and scientists outside school. Thus, students were 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). Finally, to complete this approach, we explored whether any insights related to the ECR 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?"*).

*Collège Les Toupets (Vauréal)*

### ***Students' interaction with teachers***

More than **two third of the students (69%, 13 students) considered that teachers helped them doing the tasks during the workshops**. 21% of the students answered neutral (4 students). Students who reported that teachers did not help them during the workshops (2 students) were two girls from the second group (Group 2). There was not any statistically relevant difference either between boys and girls or between the groups.

### ***Students' interaction with ECR***

**63% of the students (12 students) reported that they wished they had had more interaction with young researchers**. 21% of the students (4), provided a neutral answer, and 16% of them

reported they did not wish more interaction with ECR (3 students). There was not any statistically relevant difference either between boys and girls or between the groups.

As Figures 3 and 4 show, **most students never visited a research center** as only 4 of them reported they visit it once or twice a year. Only **56%** of them (14 students) reported **to have visited museum**. However, the frequency of their visit is low, as all these students reported that they visit museum only once or twice a year. This could be partially explained by visits organized within the school and by visits with their families and/or other institutions outside school.

Finally, regarding students open questions, none of them reported aspects related to the presence of young researchers.

Among the things students reported they have learnt during the project, 11 students reported either things related to science in general or specific scientific topics developed during the PERSEIA. One student reported he learnt *“to not believe on one idea presented by a researcher rather on ideas presented by several researchers »*. However, no student reported learning about the ECR specific research topics.

Figure 1During the workshops; the teachers helped us doing the tasks. Scale of agreement: from 1 (strongly disagree) to 7 (strongly agree).6 students didn't answer to this question

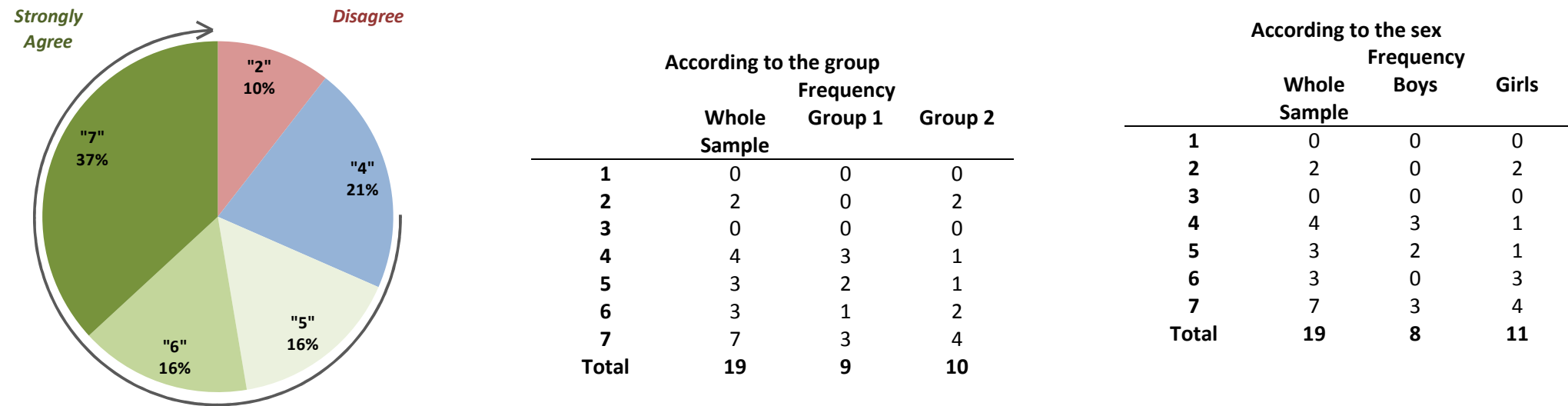


Figure 2 I wish I could have had more interaction with the young researchers. Scale of agreement: from 1 (strongly disagree) to 7 (strongly agree).6 students didn't answer to this question

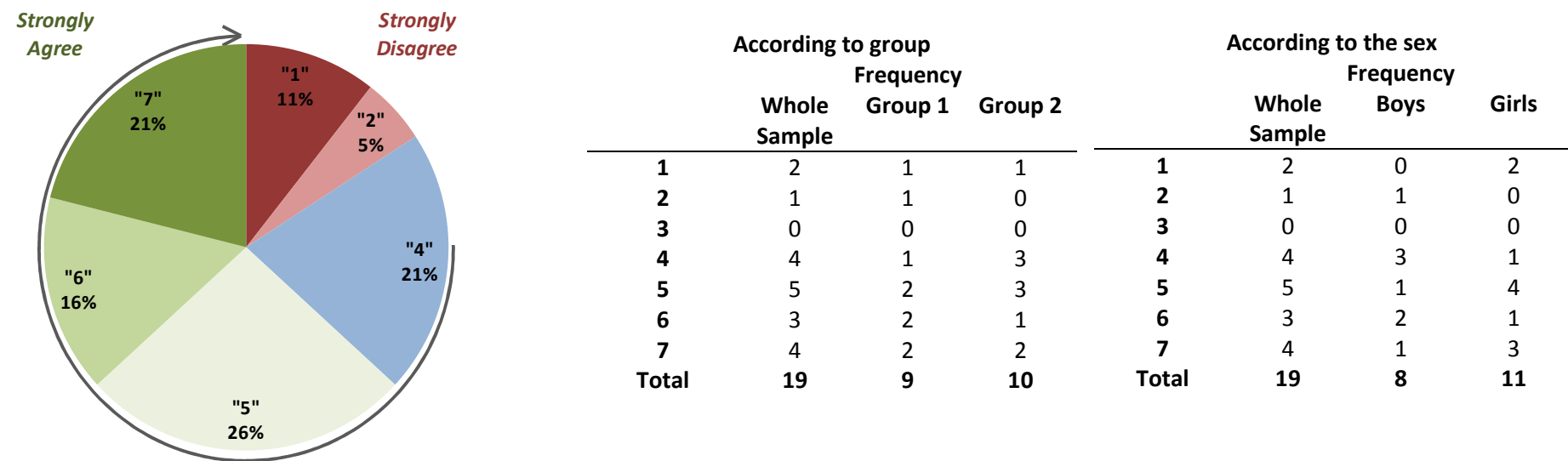
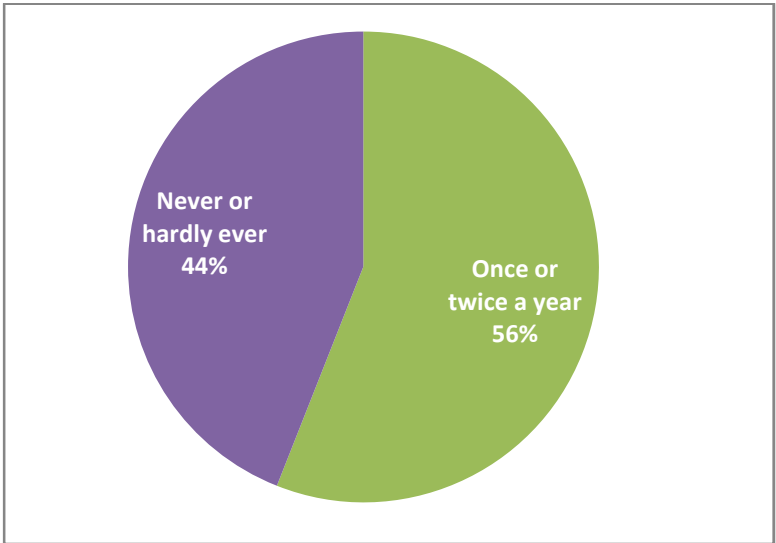


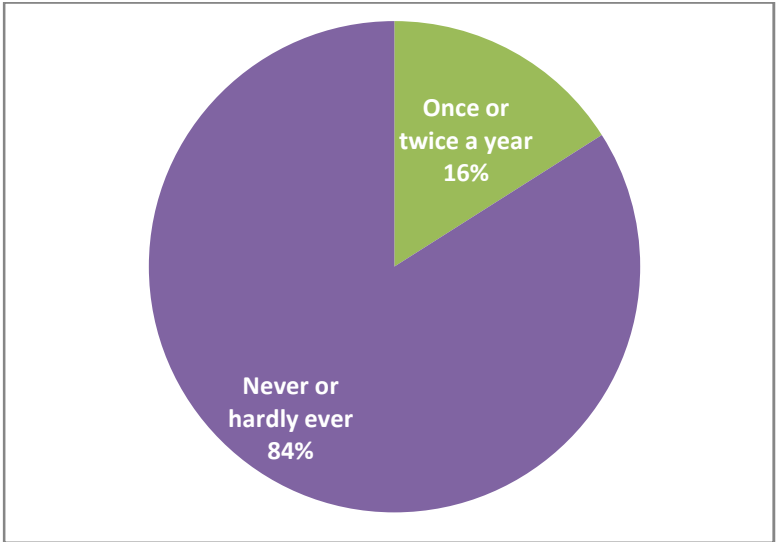
Figure 3 How often do you attend a science museum, science festival or scientific exhibition?



	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	0	14	11
BOYS	0	0	9	2
GIRLS	0	0	5	9

\* 25 students answered to the pre-PERSEIA questionnaire (11 boys and 14 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	0	4	21
BOYS	0	0	3	8
GIRLS	0	0	1	13

22 students (15 girls and 7 boys) answered to the questionnaire post-PERSEIA.

### ***Students' interaction with teachers***

Regarding their interaction with teachers (see Figure 5), in sharp contrast with Vauréal, students' answers are mitigate, with only almost **one third reporting that teachers helped them doing the tasks during the workshops**(38% - 8). Almost the same proportion considered teachers did not help them and 27% gave neutral answers. A higher proportion of students gave negative answers in Group 2 than in Group 1 (42% vs 30% respectively). In the same line, a higher proportion of boys provided negative answers than girls (43% vs 33% respectively). However, there were no statistically relevant differences either between boys and girls or between the groups.

### ***Students' interaction with ECR***

Regarding their interaction with ECR (see Figure 6), **52% of the students in Marie Curie (11 students) reported that they wish they had had more interaction with ECR**. However, and similarly to Vauréal, one third (33%, 7 students) provided a neutral answer, suggesting that there is also **a group of students that feel indifferent to this issue**. In the same line with Vauréal, some students reported not wishing more interaction with ECR (3). There was not any statistically relevant difference in students' answers either between sexes or between groups.

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 Vauréal**: 9% of them reported visiting such places once or twice a month, and 56% once or twice a year (see Figure 7). This could be related to visits scheduled by the school, to their easiest accessibility to the downtown of Paris, where there is a high number of museums, but also to a family background more supportive in relation to science. However, similar to what we found in Vauréal, **most students from Marie Curie reported to never or hardly ever visiting research centers** (81% of them); with only 4 students who reported they visit research center on a yearly basis.

Finally, regarding students open questions, none of them reported aspects related to the presence of young researchers.

Among the things they have learnt during the project, 8 students reported they had learnt either things related to science in general or specific scientific topics developed during the PERSEIA, but once again, no student reported learning about the ECR specific research topics. However, two students reported they learnt "the different kinds of scientists" and "not to trust the 'clichés' about the scientists".

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

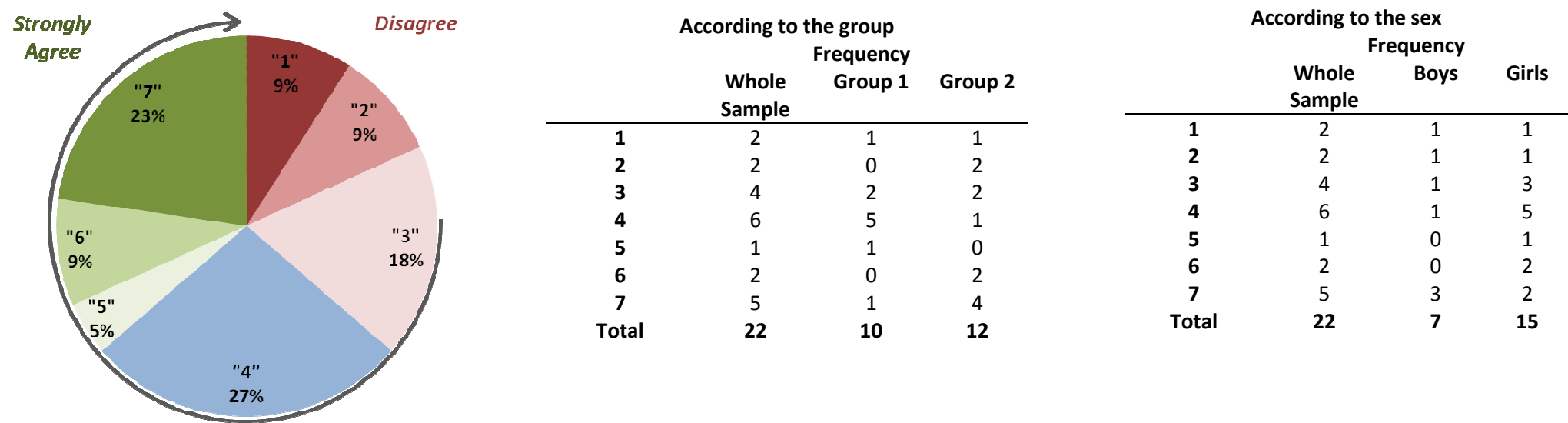


Figure 6. I wish I could have had more interaction with the young researchers. Scale of agreement: from 1 (strongly disagree) to 7 (strongly agree).

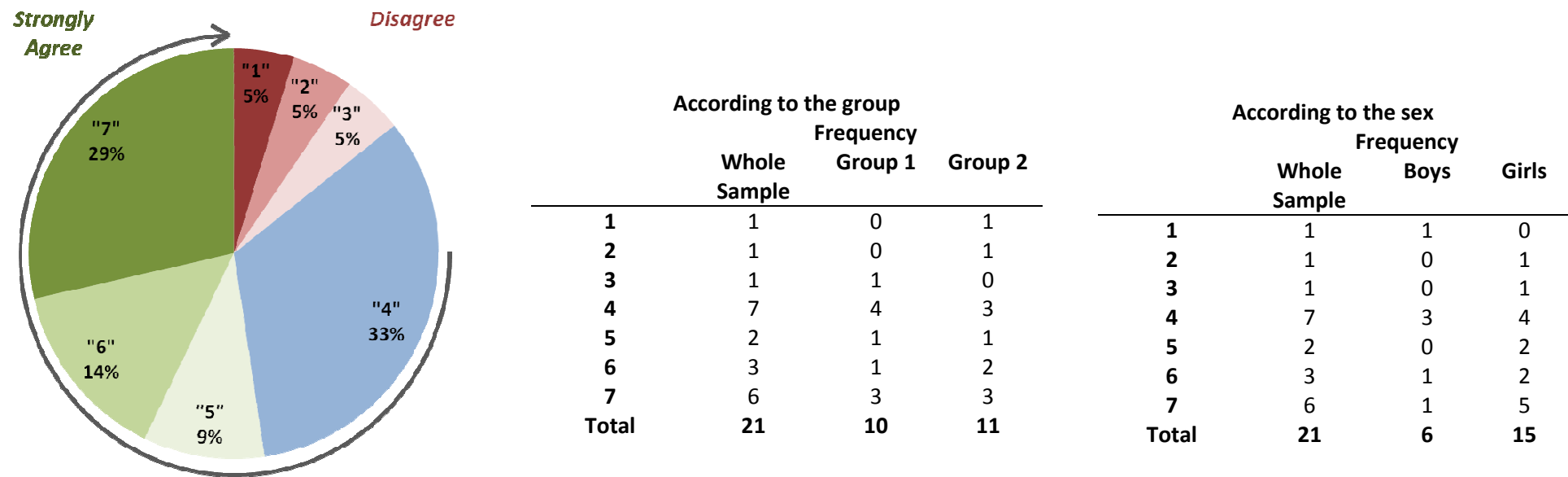
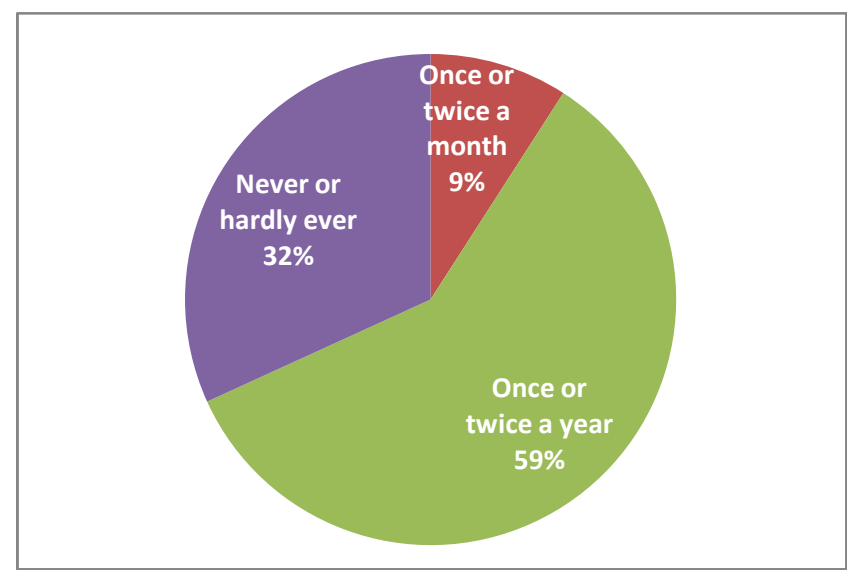


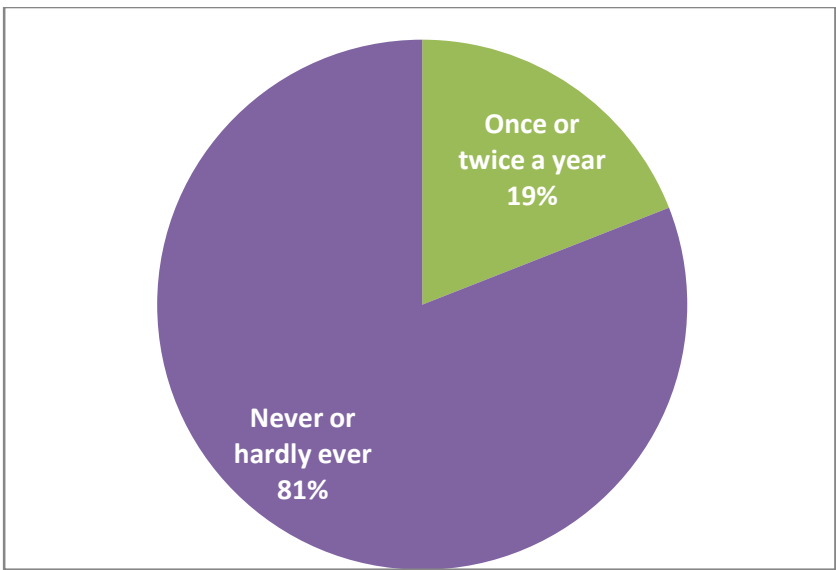
Figure 7 How often do you attend a science museum, science festival or scientific exhibition?



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	2	13	7
BOYS	0	1	4	2
GIRLS	0	1	9	5

\* 22 students answered to the pre-PERSEIA questionnaire (7 boys and 15 girls, from both groups).

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*	0	0	4	17
BOYS	0	0	2	4
GIRLS	0	0	2	13



### 3) STUDENTS' INPUTS (II): FOCUS GROUP

- Students generally appreciated ECR's relation and involvement with them during the sessions. Although students from Marie Curie did remember well both ECR, it was harder for some students from Vauréal to remember the ECR.
- In both schools, students expressed their regret not to have had enough time to interact with them, and to share personal experiences about doing research. They thought the disconnection between the ECR's topics and the research questions developed for the PERSEIA had hindered such interaction.
- Students commented that their global perception about science had not changed as a consequence of the project, but that the presence of young researchers allowed them getting a broader and more accurate knowledge about scientists.
- Students from Vauréal did not clearly identify the young researchers as similar to the other 'common' researchers.
- Students suggested their interaction with ECR could be enhanced by: i) increasing the time within the workshops devoted to interaction with them and to have a continuity of ECR's presence; ii) organizing visits to research centers or museums; and iii) bringing different scientists from different backgrounds and different ages, iv) to perform in front of researchers as a tool for debating about science and scientists.
- Students suggested that if the questions developed for the PERSEIA were to be more related to ECR's topic, they should still be directly linked to students' interests in order to motivate them.

The interaction with ECRs has been explicitly addressed in the focus groups with participating students (8 to 10 students in each school, with an almost balanced representation of students from both groups). Based on results from the written questionnaire, the statement "*I wish I could have more interaction with the young researchers*" was discussed with the students. They were asked to individually indicate with color stickers (red, yellow and green) their degree of agreement to the statement what allowed us to discuss of the reasons of their position. 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.

#### *Focus group results from Collège les Toupets (Vauréal)*

As mentioned above, 63% of the students reported they wish they could have more interaction with the young researchers, while 21% of the students provided a neutral answer. In sharp contrast with the written results, all the students present during the focus group gave neutral position, except one who was agree with the statement.

When asked **how was such interaction with ECR during the workshops** and why they would have liked (or not) to interact more with them, they were first trying to remember **who were exactly the ECR**. Although students from Group 1 remembered easily who the ECR was, some students from Group 2 were trying to remember the ECR, by reminding how she looked like.

Students expressed that their position was mostly neutral as the space and time dedicated to the sharing with the ECR was too short to have a clear opinion. During the discussion, however, students progressively reported sharing more with the ECR would have interested them. They reported they appreciated the way the ECR interacted with them, that it was easy to communicate and comfortable. However, students pointed out some limitations to the type of interactions that occurred during the project. First of all, they reported that **their topics were disconnected from ECR's ones**, and that there **was not any clear subject in common**.

Students explained to us that was the reason why they did not interact with and know much about the young researchers. Students from Group 1 justified they might feel this because in their specific case, their research question was not related to ECR topic, but that maybe it was not representative of the whole group, as some students might have had more connection with ECR's topics.

Students from Group 1 also underlined the limitations of the kind of **interaction the ECR got with them, what occurred in a more classical way of teaching situation**, with the adult presenting or explaining things to the students who were listening at him, as illustrated in the following quote:

*"Girl2: well, the ECR did talk well, about his topic, his things, and thus, we could not really exchange with him about as he was talking a lot."*

*Girl1: He helped us about during the activity about the articles; but then, it was more related to his subject, what was not our subject. »*

In this sense, even if students did not see this way of sharing as a problem, they agreed to say it had some limitations to deeper interact with the ECR.

Students from Group 2 however reported the ECR accompanied them with the research about their questions and during the activities, especially for some questions related. They expressed they would have liked to discuss about their own questions; **they did not have the time neither the space nor the subject to share with the ECR**.

When asked about the **kind of inputs they could have received from the ECR**, all were agree to say they learned something, but without giving any examples. Moreover, many of them reported they did not integrate and understand what the ECR shared with them, as illustrated in the following quote:

*"Me: Did you learn something thanks to the ECR?"*

*Almost all: Yes*

*Girl2: Well, but to be honest, I have to say I remember almost nothing from that*

*Girl3: we have to be honest*

*Girl1: Yes, it was not evident to understand what he was saying; I did not understand well what the ECR was saying*

*Girl7: Yes, it was hard also to understand all the process related to the brain and the drugs*

*Girl5: yes. I did not understand it well*

*Boy1: It was hard to understand but with the theater, it was entering, we understand more. Thus we could learn things. I did learn things in relation to the neurotransmitters."*

When asked about **the kind of interactions that could help to enhance a better sharing and communication with the ECR**, students mentioned the idea of dedicating **time to ask the**

researchers all the questions students could have, but also to visit them directly in their own work site.

Finally, when asked **whether the fact of interacting with young researcher could have had an impact on how students perceive science and the scientists**, they gave us a **mitigate answer**. From one side they reported that **they are more aware of the differences that exist between the scientists**. However, even if students seemed to get a broader notion of what a scientist might be, including also young people, they did not clearly identify the ECR as “real” scientists:

*"Girl6: there are also PhD students as scientists and others..."*

*Boy 1: yes they had an impact on our perception, a little one.*

*Girl 2: yes they had. Well, they [the ECR] looked different and basically they were doing research by another approach [than other scientists]. But, even if we did not have that much interaction with them, we saw that they were not using similar methods than other scientists."*

Moreover, they explained to us that even if some perceptions have changed thanks to the project that **they still keep their stereotypical picture of the crazy old scientist with his white coat**. They clearly identified that this stereotypical view they have is mostly due to what they can watch or get from the television, the series and the comics, as we can see below:

*"Girl 2: For me, even if my point of view has changed, I will have still always the picture in front of me, it will be automatic. What I mean, what I want to say is that after the sessions with the PERFORM; my point of view has changed. When, for instance, one would say scientist, I could think even on young people like us, but basically, when you will say to me scientists, directly I will have the picture in my mind of an old person with a white coat in a laboratory*

*Boy 1: Yes, but this comes from comics*

*Many of them at the same time: Yes, it's clear"*

In **relation to the topic developed during the PERSEIA**, when asked whether « *the topic of my research question motivated me to get involved in the project* », students reported mitigate answers, as half of them reported neutral answers and half of them answered positively. When asked why they did not know why they did not feel motivated by the topic of their research question, **many of them could not even remember their own research question**, and for the ones who answered neutral, they did not know how to justify their choice. However, the ones who answered positively were saying that the scene included their research question. In contrast, many students reported that their research questions were not included in the scene, because the session, in which it was decided to settle the different themes/scenes, they were not present. However, even if some questions were not part of the final PERSEIA, students reported it did not affect them or disturb them in their motivation toward the realization of the workshops. In the same line, students reported to us that they **could have been interested by questions more related to ECR's topic**, but without giving us much more input on this possibility. However, they acknowledged the fact they would have been interested to know more on ECR's research, as shown below.

Finally, students agreed to say that if we would have had more time to exchange with the ECR, to know more on their own work and personal story, their perception of scientists and science could have also changed, as one of the student said: **«if we would have got more time, we could have seen their world, and changed our perception in relation to the science for sure.»**  
*Focus group results from Collège Marie Curie (Paris 18<sup>ème</sup>)*

Accordingly with survey results, most of the students indicated agreement with the statement *"I wish I could have more interaction with the young researchers"* (6 green stickers), while 3 were in the neutral position.

When asking why they wish they could have more interaction with the young researchers, in contrast with Vauréal, **students remembered easily who were the ECR involved**, but recognized they would have liked to know also the ECR who was not directly working in their group.

They reported there was too little time devoted to interact with them.

*"I think we have not talked enough with them (Girl 5, from the other group agreed). She {the ECR} was there but without being really there. She was with us during the warming up, but that's all. She explained to us her work 'vite fait bien fait' but without more. Thus, we could not be in real contact with her. » (Girl 2)*

Students were then asked how such interaction with ECR was during the workshops and why they would have liked to interact more with them. All students agreed that the **relationship with ECR was good**.

When asked about **the kind of interactions that could help to enhance a better sharing and communication with the ECR**, students, once again, reported the importance to **dedicate more time of sharing with the ECR**, as students from Vauréal suggested, for students to be able to ask whatever they want to the ECR, but also to get the ECR more involved **in all the sessions**, *« that they stay with us, as Paul did »,* in order to better know what are their research, their work, in order to *« further know what they do »* (Girl 5).

They also reported the idea to **join both groups at the beginning of the session in order to better know who are the different facilitators and ECR present in both groups**.

In order to have a broader overview on science and researchers, one student suggested the idea to **make intervene different kinds of scientists**, specifically **from different ages**, as she specifically reported *"And to find older scientists; young researchers, but also older, in order to show the differences, more elaborated researches and all they could have done. »*

One student specifically reported to organize a **session in which students could perform scenes showing their stereotypical perceptions about scientists and science in front of researchers, in order to introduce a discussion with the researcher in order to go through the different clichés student could have:**

*"Girl 2: to do, for instance, a questions' foire, during which we could all ask whatever we want, and also during which we could perform mini scene in which we could talk about the clichés related to scientists, about this theme of the clichés.*

*Boy 4: performing improvisations*

*Girl 2: and then us {the researchers}, they intervened and deconstruct all {the clichés} we presented."*

In **relation to the topic developed during the PERSEIA**, some students reported it did not motivate them to be part of the project and three of them gave neutral answers. They explained that the topics developed during the PERSEIA was not necessary related to their research questions and that some of them did not involve time to search for answers during the time out of the workshops. In that sense, some of them seemed quite indifferent to the research question as a motor to motivate them for the project.

In relation to the possibility to **relate more their research on ECR's topics**, they seemed to agree with this idea, but students identified the **necessity to propose to students research questions and topics that is linked to students' and adolescents' interests**, and that are not too complex, as Girl 2 said *« it depends on the complexity, and it also needs to relate to students, to adolescents, because to get a question very psychological or others, it will be less interesting than, for instance, the conflicts between districts. This was interesting because we felt affected by it. »* Then, students clearly acknowledged the fact that the topics developed in the PERSEIA, such as the thematic related to the future, the conflicts between districts and the questions related to the characteristics of friendships between boys and girls, the impacts of social media on adolescents, really interested them as PERFORM group, but also the public when they performed their show.

Finally, when asked **whether the fact of interacting with young researcher could have had an impact on how students perceive science and the scientists**, none of them expressed a significant change in their perception. They first of all say that the realization of the workshops did impact on their perceptions about science **but that it was not really due to the presence of the ECR**. Indeed, they clearly identify **the lack of time they had to interact with them as first reason of this absence of change in their perception**, as suggested in the following quote:

*"Me: Did the fact to have seen and interacted with ECR change your perception of the scientists?"*

*Girl 2: well, no. In fact we have not seen them that much*

*Boy 2: yes we have not*

*Boy 4: at the same time, at the beginning, they talked, but then, they were looking at us*

*Girl 2: but without real contact to know more what she was doing, her real job, etc. »*

*Girl 4: but the ECR, she was quite shy*

*Girl 3: we only had one session with her and she explained to us what she was doing and that was all »*

#### 4) TEACHERS' INTERVIEW

##### *Teachers' general impressions:*

- Overall, the teachers were feeling positive about having had PERFORM in their school and reported to have seen positive impacts on students.
- Teachers found that the workload implied by the project was satisfactory but underlined their willingness to have a more active role in the process.
- Teachers identified the lack of a specific role assigned to them as the main limitation hindering their involvement during the workshops. It conducted to a general feeling of uselessness, especially for the teachers of Vauréal.
- Teachers felt that more workshops/time would have been needed to better achieve this project.
- In both schools, teachers showed their willingness to continue with the project in the future, if adapted, and they were receptive about repeating the workshops as long as there could be a facilitator or a formation for the teachers.

##### *Teachers' proposals:*

- The project would benefit of involving the whole body of teachers and generating a closer interaction and collaboration between facilitators and teachers, settled 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 advance and debriefing discussions after the workshops.
- Teachers could be more involved in the creation of the PERSEIA, by for instance, supporting students in the writing of their script.
- More synergies could be fostered between PERFORM sessions and teachers' lessons and the school curriculum, both in terms of scientific content and students' transversal competences addressed.
- The possibility to replicate the workshops would be facilitated if teachers' team carrying the workshops is composed by at least two people with one holding scientific skills and the other performing art skills.

##### *Teachers interview at Collège Les Toupets (Vauréal)*

We conducted a 80 minutes' group interview with the 4 teachers actively involved in the project this year<sup>1</sup>.

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<sup>1</sup> This formal interview has been also completed with another informal discussion with other teachers (teachers who attended to the final PERSEIA) and one member from the direction of the school, who showed, since the beginning of the workshops, a high interest in the project.

### ***Teachers' involvement in the project: role and workload assumed***

Regarding teachers' **interaction with PERFORM prior to the workshops**, the first contact of teachers with PERFORM members had taken place during the previous school year, when Traces approached the school and performed. From the different students who attended the performance, those most interested were selected to be part of the project. At the beginning of the school year (September 2016), a second meeting was held between Traces and the teachers in charge of the project, in order to plan logistical aspects (such as the schedule) and to present the main topics to be approached during the workshops. There was not any other meeting between the facilitators and the teachers before the beginning of the workshops.

At the starting of the workshops, two different teachers were present in each group, attending alternatively to the workshops. Since one teacher had to be replaced after the second workshop, most teachers did not have had previous contact with the facilitators before getting involved in the workshops.

Regarding **their role and workload**, teachers deplored that their **role was only as logistical support**, running after the missing students, organizing the rooms, etc. They quickly expressed that it induced for them a **strong feeling of uselessness** and they **regretted not to have been enough connected to the organization of the workshops** and not having had more interaction with the facilitators. All teachers agreed that they **did not know what they were supposed to do during the workshops**. According to them, **that was directly related to the fact that no time was devoted to meet with all the members of the project and to know more of the workshops protocols**. In this sense, all teachers reported having felt **useless** during the project.

Moreover, because of this lack of communication previous to the workshops, **teachers reported they felt disconnected from the process**. They would have been more actively involved if they would have had the chance to. In this regard, they identified **missing opportunities of engagement and of establishing synergies with the students' process as a consequence of this lack of information and anticipation**. See for instance:

*«Teacher 1: Well me, I felt quite uselessness, often. Didn't you? (To Teacher 3)*

*Teacher 3: Yes I did. After the session where there was a work on the articles, where students had to work in subgroups, in fact there were scientific documents, and because we did attend to the workshops once every two weeks with my colleague, this time, I did not go. If we would have known this session was about scientific documents, maybe I would have gone, and she would have attended another session. Because there, she wondered what she would have to do in this session during two hours. »*

This lack of communication also provoked a **feeling of doubt** among the teachers, who reported they **did not know how to behave/position** during the workshops:

*« It is also that we did not know how to position. Because we did not really have had the time to see each other before, since the first workshops, it is true that they did not say what would be done the next session, and thus, it is true that we were spectators and that we could not intervene. I know we permitted ourselves to intervene on two or three aspects, but we did not know whether it was welcomed, we did not know how it was received». (Teacher 3, Group 2)*

*« What is the place of the teacher in such kind of activities? Are we there as guards or could we be actors by participating to the acting or in the construction of the sessions? We did not dare to intervene. What was our place? » (Teacher 4, Group 2)*

They found their **workload was almost null**, as they could not prepare any materials or do any follow-up connected to the subject during the sessions. In this line, they regretted that the only communication in-between workshops took place before the performance of the Perseia. It led to some misunderstanding when they received from the facilitators the final script and they found some elements that, according to them, were not appropriate to the context and suggested to take them out. A teacher explained to us that she commented this because she knew such elements did not come from student's inputs. According to them, this situation created a tension between the facilitator and the teachers, as they did not know each other well, and had no time *"to share, sit on a table and collaborate in the creation of the workshops"* (Teacher 4).

Teachers got also **involved out of the workshops**. They **took Perform students twice**: one time during one hour a half for helping them in students' research about their question and the second time during two hours for training them in order students to rehearse their show, **what allowed them to provide not only a logistical but also an emotional support** to the students. Moreover, provided supported to PW4 by carrying the written PRE and POST surveys among students from the control group (students who did not participate to the workshops) and the POST surveys among PERFORM students. They did not seem to perceive this extra work (for both supporting students for the performance and for PW4 tasks) as negative but rather **as an implicit responsibility in the project**.

In relation to **the frequency of the sessions and the length of the project**, teachers reported they found the **period adapted**, as it was settled between two periods of holidays. They agreed that it would have been necessary to **have more sessions**. However, they appreciated the fact that the workshops were close the one from the other and said that if the whole period would have lasted longer, the attention and motivation of students would have probably decreased. They only regretted, as already mentioned above, the length of each workshop. They considered **the workshops could be longer, in order to have extra time before and after to meet with the other members of the Perform**. One teacher indeed proposed to have 30 minutes more, with one quarter before to meet and talk about the workshops and one quarter afterwards in order to do a breafing of what happened during the session and what would be the next steps.

Teachers also proposed some **other alternatives to their engagement in the workshops**. They explained that if they **had been aware of the protocols of each workshop, they would have been more involved in helping and supporting the PERSEIAs**:

*« (...) I did understand that students would have to write by themselves the scene, and that maybe we could have given some ideas or guide some students in the writing of the sketches. Thus, it is above all to help the director and the actors to reach with the students to the writing of this scene. It is above this aspect. »* (Teacher 4)

#### ***Teachers' willingness to continue engaged: proposals***

Despite of these regrets about the lack of coordination which led to a feeling of uselessness, **teachers were really satisfied by the fruit of the project and highly motivated to keep involved in PERFORM**. Even before the interview, right after the performance of the PERSEIA, both teachers and an administrative member asked us whether it would be possible to repeat this experience in the school. They were highly enthusiastic and motivated, which was still the case during the interview conducted two months after the performance of the PERSEIA. They also really appreciated the fact of being able to see and interact with students (even if few



times) **outside of class context**. Indeed, for them it was an opportunity to have a relation with students different from the one they used to have when giving classes.

Regarding teachers' willingness to implement similar workshops without the presence of a professional of theater or science mediator, **most teachers were doubtful about their skills to carry this kind of project alone**. In that sense, they agreed that the **support of PERFORM members** (facilitators, researchers, university) would be essential for them to replicate the project. They visualized the continuity of the project as a joint venture and not to be developed in their own. However, they were also suggesting that this kind of project should involve a teachers' **duo, formed by a teacher in science and another one in literature, including one of them who has experience with theatrical tools, methods and approaches**.

Moreover, some of them reported the importance of being **trained** for this kind of pedagogical approach.

Finally, teachers highlighted one last crucial aspect for the proper implementation of this kind of project: **the support of the school administration**, by giving them time and budget for that.

### *Teachers interview at Collège Marie Curie (Paris 18<sup>ème</sup>)*

We conducted a 60 minutes' group interview with the 2 teachers involved in the project this year.

#### ***Teachers' involvement in the project: role and workload assumed***

Before the workshops, teachers met with one person from Traces twice. The first time was dedicated to settle together with the administration of the school the aims and requirements of the project. The second meeting aimed to share more about the logistical and themes approached specifically during the realization of the workshops. In contrast with teachers from Vauréal, **both teachers reported that their role corresponded to what they expected after these different meetings** and were not surprised by the kind of workload they carried.

At the beginning of the school year, teachers **created a specific class** with the students who had already seen the Perform project the precedent year and were interested in participating. They added to the group some students according to the requirements of the school (e.g. to create a homogenous class and follow the different optional subjects). All the students from this class were involved in the project, including both those who were aware of and interested by the workshops and those who did not know the project.

Once the project begun, according to teachers' own perceptions, they mostly carried a role **for external organization, by leading the logistical parts needed outside the workshops**.

During the workshops, as was also the case in Vauréal, teachers reported they were **mostly involved in helping to manage the class**: both by looking for missing students and to handle students who did not behave well. Somehow they **regretted they could not be more involved in students' process of research**. For instance, they would have liked to be more involved in **helping students to explore their own research questions**. However, they explained that the **little amount of time** they could devote to the project and the **timeline of the whole process** had been major reasons for this low involvement. Moreover, they highlighted that this would have been possible if the workshops would **had begun early in the school year**.

Therefore, the teachers, and especially one of them, **felt disconnected** from the whole process of the project. She recognized this feeling as mainly due to the different tasks she had to carry apart from the project, not allowing her to be more involved in PERFORM. In this line,

regarding the development of the workshops, she reported that at the middle of the process, **she did not feel confident of the feasibility of the performance and the realism to get a final product**, what made her lose trust towards the project. In this sense, she explained it was hard for her to encourage the students during the workshops. However, she said this feeling disappeared once she could see that students had two workshops before the final PERSEIA, almost all the scenes settled.

Furthermore, the other teacher reported she felt similar **stress the week before the PERSEIA**, especially because she **received from the facilitators the final script only one week before the final performance** and because **students were not ready at all**, what gave her the impression of **doing the things at the last minute**, and to have to rush with the students to be sure they would have learned the script before the PERSEIA.

*"It is true that it stressed me to receive the script from the facilitator at the last minute and to see that students said to me it was the last one and that there have been many changes on it, and to see that few days before the performance, it was not all clear, and that it will have a performance, and... and thus, it was hard... we tried to find time to make students rehearse before. We only had one hour, it was out of schooling time, thus they were not all there, and that implied even more stress for us, but also for the students...well..." (Teacher 2, Group 1)*

Indeed, as reported in the previous quotation, teachers **provided some help to the students** out of the workshops, especially for the **rehearsal** of their different scenes. At the end of the project, teachers mentioned they dedicated between 2 and 3 hours to rehearse the different scenes for the final performance. The day of the performance, teachers were supportive to the students, and took time with some students who were really anxious. As was the case in Vauréal, teachers perceived this involvement **as satisfactory and as an implicit responsibility in the participation of the project**. Finally, both teachers got involved **supporting the process of WP4**, by managing the realization of the PRE and POST survey among control groups.

In relation to the **frequency and overall duration of the workshops**, teachers clearly indicated that **this period did not seem long enough to really reach the project's objectives**. They felt indeed that **it lacked time to better develop the content of the PERSEIA** (further details in the analysis of Goal 4). In this sense, teachers also recognized that a longer period would have allowed them to better support students in their research, as illustrated by the following:

*« I could have realized these researches with them, but there, I did not have the time because the workshops were too close from each others, because I did not see them, because they was the examination to prepare and well, a lot o external constraints that implied I could not see them that much (...) I guess it would have been worth to begin the researches since the beginning of the schooling year, I could have helped, by doing sessions on that, by doing practical work about that, in order to have more content to be included in the show. » (Teacher 1 Group 2)*

#### **Teachers' willingness to continue engaged: proposals**

Both teachers reported **their interest to keep supporting the PERFORM project**, by reading/revising new protocols of workshops and being available to provide feedbacks if needed.

Regarding teachers' willingness to **implement similar workshops without the help of science communicators and facilitators**, teachers reported they **would like to be able to reproduce the workshops in the school where they teach**. They reported they would be really interested in reproducing a similar approach and in being active in the creation of the performance. However, they explained they would need to **create a team of at least two teachers with theater and scientific skills**.

Moreover, they highlighted that **both disciplines (French and Sciences) could be better merged in the process of the creation of the performance**, as one teacher proposed:

*« Once the scientific approach is there and ready, well, there are many things we could do with both disciplines, such as the writing of a scientific approach, presenting the results of an analysis; doing a summary of something, having debates... there are a lot of possibilities ».* (Teacher 2)

As possibilities of improvement, teachers also suggested to **better integrate the thematic developed during the project to the school curricula**. Indeed, because the workshops were taking place at the times of their teaching classes, it implied that they had to adapt their schedule to be able to teach the entire school program to the students involved in the PERFORM. In this sense, they perceived that if the project was able to integrate also elements from the school curricula, this approach would be a potential driver for teachers to see the interest of this project and to be more involved in it:

*« Teacher 2: It is true that it would be good to better link the thematic explored through the school program ; I guess it would be a motivating factor for teachers, as indeed if it takes the time of our classes, at least that students could advance our school program. And somehow, it (would make it) more interesting »*

*Teacher 1: ...And we could also find (a way) to develop some spectacular experiences that also enter into the thematic of the school program and that could be shown in front of other students. In this sense, it would make the link between research, theater and the fact of communicating about it, but it implies a considerable constraint. »*

## 5) ECR WRITTEN INTERVIEW

ECR's general impressions:

- Overall, the ECR expressed a quite negative feedback from their experience in the project. This feeling varied between schools, with more negative experiences in Vauréal than in Marie Curie.
- They all regretted the lack of organization, of upstream collaboration for the preparation of the workshops and expressed their feeling of uselessness.
- They all deplored the little amount of time devoted for them to present their own work and/or to share with students.
- ECR generally considered that their interaction with students could not have any impact in fostering students' motivation and curiosity towards science, due to the way they have been proposed to participate in the workshops.

ECR's proposals of improvement:

- The workshop guidelines should be designed in collaboration with the ECR since the beginning. ECR's role as young researchers needs to be clearly identified within the guidelines and provide more spaces in the workshops for mutual sharing about science and research between the ECR and the students.
- Such guidelines could also be jointly discussed among facilitators and ECR with time before the workshops. Both things could help clarify ECR's 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.
- Having more time for face-to-face sharing with the facilitators in-between workshops could help ECR reflect about their interventions and better understand the process.
- A visit to research centers and scientific festivals or using scientific WebPages were suggested as potential activities to further strengthen the relationship of students with science and between students and ECR.

ECR's feedbacks and feelings related to the project have been gathered through a written survey, responded by the four ECR involved in PERFORM.

### *Inputs from ECR participating at Collège Les Toupets (Vauréal)*

First of all, in relation to the **kind of interactions the ECR could have with the students** during the different workshops they attended, both ECR agreed that **they did not have any interaction with the students**. They expressed they felt useless, and that **their presence was not essential considering the structure of the workshop**.

In relation to the **kind of knowledge they could share** about their own research topic, one was straight, answering **they could not share anything**. They explained it by deploring **they only had between 5 and 20 minutes** to present their research and that **this little amount of time was not adapted to really have the chance to share with students**. Despite of this issue, they reported they might have contributed bringing a different approach to specific students' points, clarifying some scientific or technical concepts during the debate or sharing with students. However, they deplored that it was not directly related to their research topic.

Through the interviews, and coherent with what the PW3 reported in April, **the overall feeling was quite negative**. They deplored they had neither time to share with the students nor enough space to discuss with them. Moreover, they were skeptical about the interest of their presence during the workshops, as ECR 1 reported:

*« I could certainly bring another different method to formulate (students') answers when we put in common what had been learned during the exercise about the articles. I doubt that it was more pertinent than what the facilitators could have been able to say themselves during this given time » (ECR 1)*

This overall feeling of disappointment might have contributed to their opinion related to their participation within the project. **They said they would have been more involved if the conditions would have allowed them to**. They justified their motivation by the fact that they had invested the time in transportation to reach the school. Indeed, this school was located almost one hour a half far from the center of Paris. However, for them to get more involved, one ECR specifically reported that **the activities developed during the workshops should be related to the topic of the ECR**.

They clearly reported that the assumption of the project that "creating a **closer interaction between students and researchers** could foster students' interest and motivation towards science **had not occur**. They identified that to reach this goal, it should be **first fixed an area of research and then develop a real research approach**. Moreover, both agreed that one of the requirements for that would be, once again, that students' topics were related to the ECR's research. In this line, one of them proposed to first define the research topic that will be developed for the PERSEIA in order to look afterwards for ECR whose topic are related to this research question.

**In order to foster a closer contact with ECR**, they reported first of all the importance of **creating the workshop in collaboration with them**. They also mentioned that other spaces might be interesting to create a closer relation between students such as **scientific festivals**. They mentioned that it might be interesting to **create a webpage** where students could "comment, question, discuss etc" (ECR 2) directly with researchers. Finally, they also proposed to **invite students to visit the different ECR's research centers and laboratories** as a good option to improve a closer interaction between them and the students.

#### *Inputs from ECR participating at Collège Marie Curie (Paris 18<sup>ème</sup>)*

Both ECR agreed that **their interaction with students was positive** and that they were attentive and seemed interested by what the ECR were sharing with them, by asking many questions when the ECR were presenting their own research topic. One ECR reported that students asked her many interesting and diverse questions, and also somehow quite technical. The other one felt students seemed really active and interesting when they were working in

subgroup for the elaboration of student's own questionnaire in order to answer to their research question.

However, both ECR reported **they could not have enough interaction with students**, neither with the whole group of students nor about other scientific aspects/topics. One felt that students could have been intimidated by the first presentation because it was quite formal, like a class, reason why students might have not been so comfortable with asking her questions out of the time devoted to her presentation. The other ECR also reported that **this low amount of interaction with the whole group** might have been due to the fact that **she did not know her exact role**, and thus was waiting for the facilitators to invite her to talk.

In relation to the **kind of knowledge and experience the ECR could share with students**, they reported **some notions about their discipline**, and also **about the way to define a first research question and to develop a method of data collection**. In relation to this latter aspect, the ECR reported that *« I felt they seized this more than other things because it was concrete, they knew it would be useful, that students would answer to it. »* In the same line, the other ECR reported she mostly shared **technical knowledge** with students, explaining that students were mostly asking her, during her presentation and during the debate about the articles (Critical Thinking PW3).

Both reported they felt students understood and remember what the ECR explained, but not for all the aspects shared, mostly because they could not have enough time and without a appropriate space for that, as one of them reported when asked what has she shared and how the students reacted to it:

*« Some notions about how to define a first research question. It interested them because they were free to choose the topic they wanted. But it was quick (no more than 5 minutes, and stood up in an indefinite space) and it was more a case by case than a clear explication about generic rules, thus, the reach has not been big in term of learning I guess. »* (ECR 1)

In relation to **ECR's role during the workshops**, only one reported she could bring other elements not directly related to her research topic. She specifically mentioned the absence of connection between their training provided by WP3 and their involvement within the workshops.

*« The preparation (our training with Livio) invited us to think deeper on our way to do research and on what we wanted to transmit **but we did not have the space for that**. Anissa and Berenice assisted to a part of this training thus we had moment for thinking on what we could bring to the students (which info, which support, etc.) **but it has not been used at all**. »* (ECR 2)

Overall, they both **regretted the lack of communication with PERFORM members** before the beginning of the workshops.

*« Maybe I did not take enough space during the workshops, but the fact to not know the proceeding in advance did not allow me to contribute a lot (...) I often felt I was a spectator of the workshop. »* (ECR 2)

Both ECR reported **they would have been more involved if they had had the chance to**. As main limitations of their investment both ECR identified the **absence of a clear role within the workshops** and the **lack of a previous coordination with facilitators before the realization of the workshops**.

*« My place was clearly defined thus I felt a little bit as doing figuration, even if I appreciated to be in contact with students. » (ECR 1)*

Somehow, this lack of coordination induced a feeling of **not being really part of the team**, and somehow provoked the disengagement of the ECR, reinforced by a feeling of **frustration**, as clearly the following quotation reveals:

*« I think I would have been more involved, indeed. First, I would have participated to more sessions if I had more details about the workshops and more space within the workshops. I really appreciated the dialogue that happened with student the day I prepared the workshop. Maybe the fact of not being part of any team's meeting for the preparation does help to feel integrated to the project. In almost every session I had to contact them again to know if the workshop would take place or other things. We don't feel integrate ! The final show was also the proof of this (once again a mail for contacting them again in order to get some info ! / Feeling of coming from the blue and not to have any place, even if it is the completion of the project and that it was nice to be there) » (ECR 2)*

Both **ECR seemed skeptical** toward the fact that **the workshops allowed to create a closer interaction between students and researchers**. One reported that students might have had been more aware of what could be a scientist and that thanks to her presence, students could also know that social sciences also exist. However, she regretted, once again the lack of time to explain them more what are the social sciences and what her daily professional life looks like. The other ECR was less convinced by the accomplishment of the objective, due to the lack of a relation of trust between students and ECR: *"As there was not any relation of trust with the students, it did not deconstruct the prejudices students could have about science for instance."*

**In order to foster a closer contact with ECR**, one ECR suggested *preparing the workshops upstream in order to get a real role during the workshops*. Then she suggested involving **more young researchers**, *"in order to get more informal times and with smaller groups of students, what would favor probably the dialogue"* (ECR 1).

Finally, the ECR **did not really have any idea about other possibilities to promote a close interaction between students and ECR**. One reported that the space of the school did not seem to be a problem for interacting with them but recognized that in this way, students do not have an idea of what are the laboratories where ECR are working. She however pointed out that visiting research laboratories might reinforce student's prejudices.

## 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 written interview with ECR. Table 1 summarizes 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 analyzed 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 analyzed 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 identifying 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 ECR 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 (Vauréal, n=25; Marie Curie, n=22)  Post-PERSEIA (Vauréal, n=19; Marie Curie, 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 <i>How often do you do these things?</i> 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: <i>Post LIKERTQ5: I wish I could have had more interaction with the researchers during the workshops (names)</i> <i>Post LIKERT Q4: During the workshops the teachers helped us doing the tasks</i>
Focus Group (Vauréal, n=10; Marie Curie, n=9)	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>I wish I could have had more interaction with the researchers during the workshops</i>  Discussion: Why? How was the interaction with ECR? Who did you interact with?

	Explore participants' perceptions towards the PERSEIAS process in terms of their own learning and experience.		<p>What have you learned from them? What was the dynamic?</p> <p>Influence of the interaction with ECR in students' perceptions of science: Has your relation to science or your 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)</p> <p>Did the interaction with young researchers influence at all in this?</p>
Group interview (Vauréal, n=4; Marie Curie, n=2)	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	<p>Questions about their role and engagement:</p> <p><i>What has been your role throughout the process and what workload has it generated?</i></p> <p><i>Would you have been more involved if you had had the chance to? How?</i></p> <p><i>Would you like to repeat these workshops in your school on your own?</i></p> <p><i>Are you interested in maintaining your involvement with PERFORM (e.g. attending a forthcoming teachers' training, giving advice on new activities, etc.)</i></p>
Written survey (Vauréal & Marie Curie n=4);	Explore ECR's perceptions about the PERSEIA participatory process, including their involvement and the interaction with students.	ECR	<p>Reflection session conducted by WP3 researchers. Interventions related to:</p> <p><i>ECR interaction and relationship with the students</i></p> <p><i>ECR role during the sessions</i></p>