The Art of Science Learning

Susciter une éducation plus intégrative par les arts du spectacle : Retours d'un projet de recherche collaboratif international sur le développement de méthodes innovantes pour l'enseignement des sciences

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Structure of the talk

1. Presentation of the PERFORM Project

2. Description of PERFORM Workshops

3. PERFORM Workshops' Assessment

4. Insights from the Assessment

Overall Framework

Few students' interest in science learning

Overall gap between science, scientifics and civil society, especially youth

European Commission / Annual Eurobarometers

Science education is crucial for boosting a more critical and democratic citizenship able to deal with current complex socio-environmental challenges in responsible ways

PERFORM Project

Participatory Engagement with Scientific and Technological Research through Performance

Exploring **new science education methods** based on:

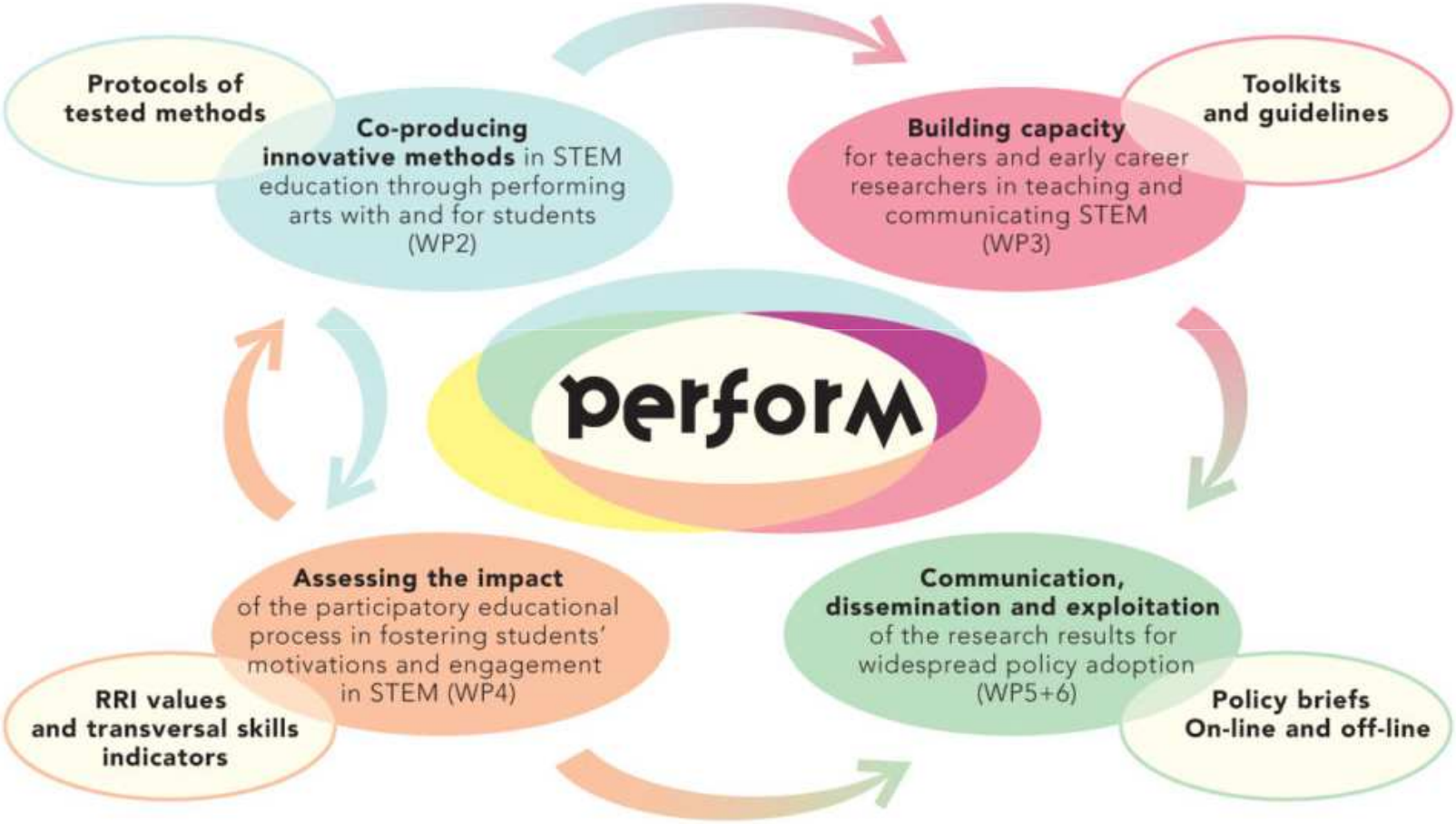
the **performing arts** and

the **direct interaction and communication between young people and researchers**

to foster young peoples' motivations and engagement with STEM

(Science, Technology, Engineering and Mathematics)

PERFORM Project



PERFORM Project

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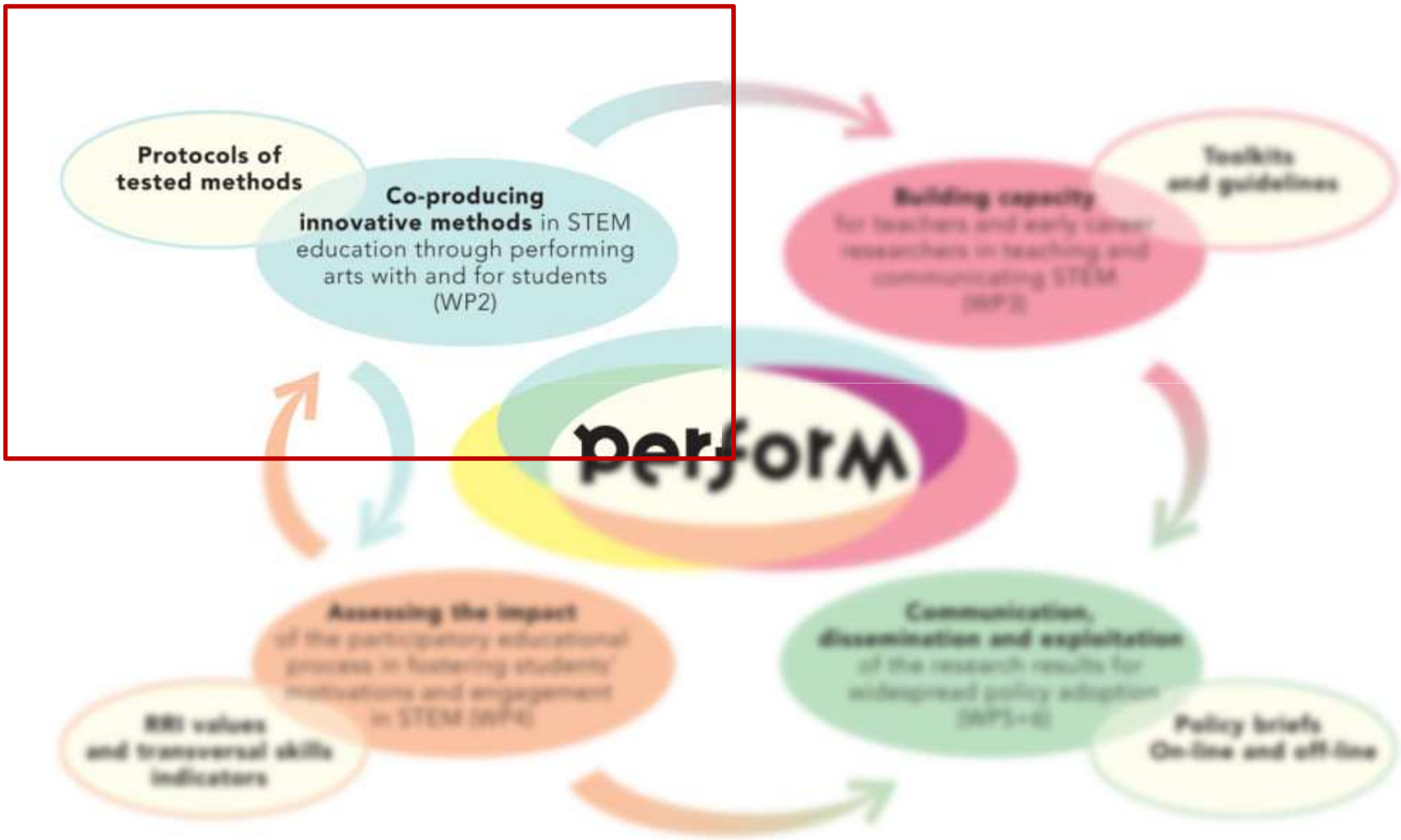

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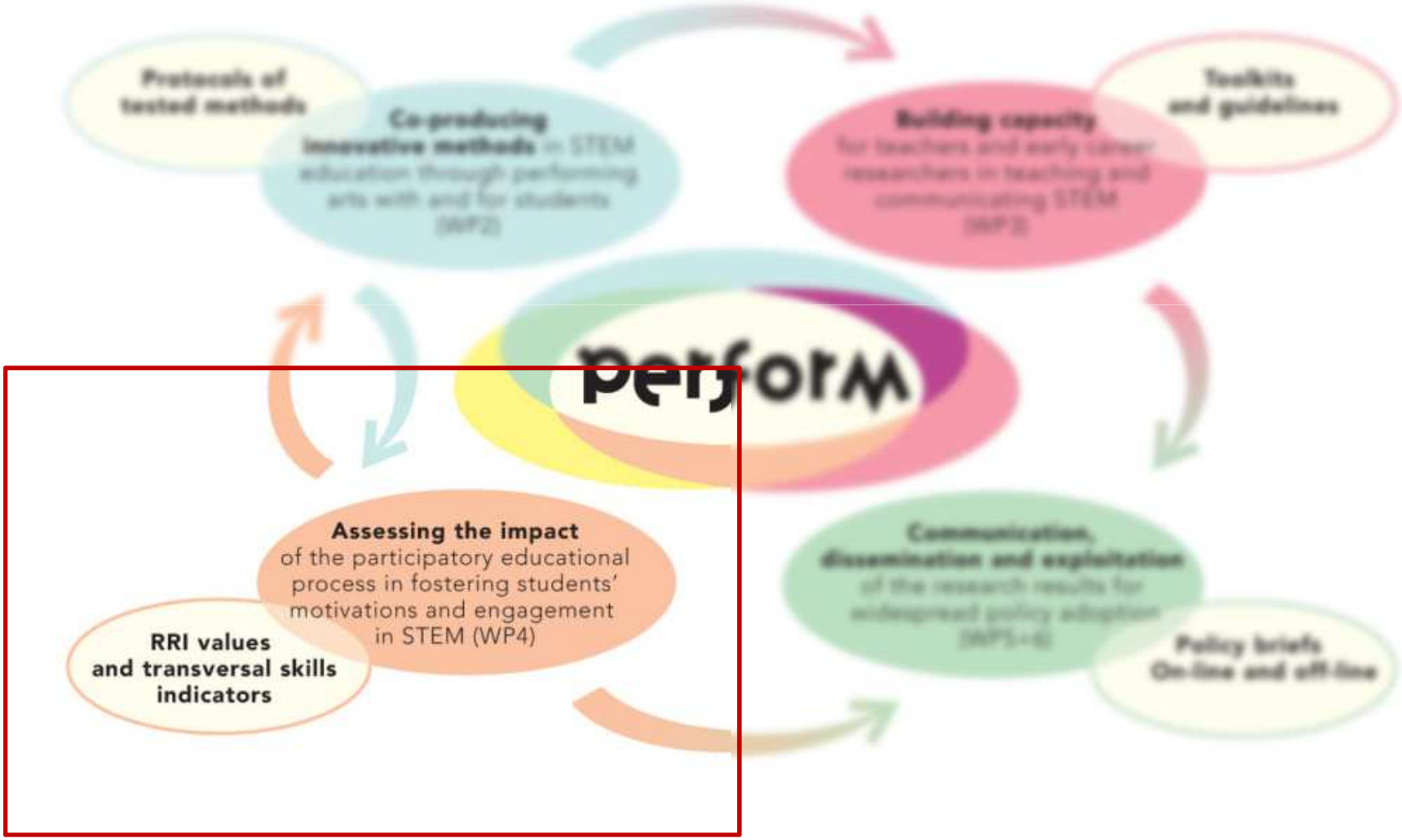


PERFORM Workshops

Innovative methods developped in STEM education through performing Arts **with and for** students:

- To promote students' learning and reflection about STEM concepts, scientists' practice and impacts and applications of science in their daily lives.

- To foster students' acquisition of the values embedded in the Responsible Research and Innovation approach (RRI)

PERFORM Workshops

<u>1st round of Participatory Workshops</u>

Three countries, Five schools

127 Students (UK 22+ FR 42+ SP 63)

From January to May 2017

PERFORM Workshops

Based on students' interest, they chose a research question they develop in order to create a performance about it.

All along the process of the project among the schools, students are accompanied in their research, combining reflection activities and exercises of scenic arts to allow them to integrate different aspects of RRI values and Transversal Competences.

In parallel, scenic arts skills and body awareness tools are fostered by the realization of different exercises.

PERFORM Workshops

6-7 sessions two hours each
1 science communicator and performer;
1 teacher
1 Early Carreer Researcher
10 to ≈ 20 students by group

FR: Theatre piece (improvisation)
SP : Monologs
UK : Busking

PERFORM Workshops

Transversal Competences

Learning to learn skills

students' ability to pursue and organize their own learning in accordance with their needs, and to the awareness of learning methods and opportunities.

Civic & Social Competences

personal, interpersonal and intercultural skills and forms of behaviour that equip individuals to participate in an effective and constructive way in social and working life.

Sense of Initiative & Entrepreneurship

Students' ability to turn ideas into action.

PERFORM Workshops

Responsible Research & Innovation Approach

Process Requirements of the workshops:

Diversity and Inclusion

Science education should cover a wide range of disciplines and engage diversity of stakeholder within the different stages of R&I

Anticipation and Reflection

Learners should be empowered with the skills to critically analyse R&I and anticipate its impacts, thereby contributing to debates

Openness and Transparency

Science education should focus on real-life challenges and link them to current R&I

Responsiveness and Adaptive Change

Students should participate in learning activities where they may help find solutions to societal challenges

To foster within the workshops:

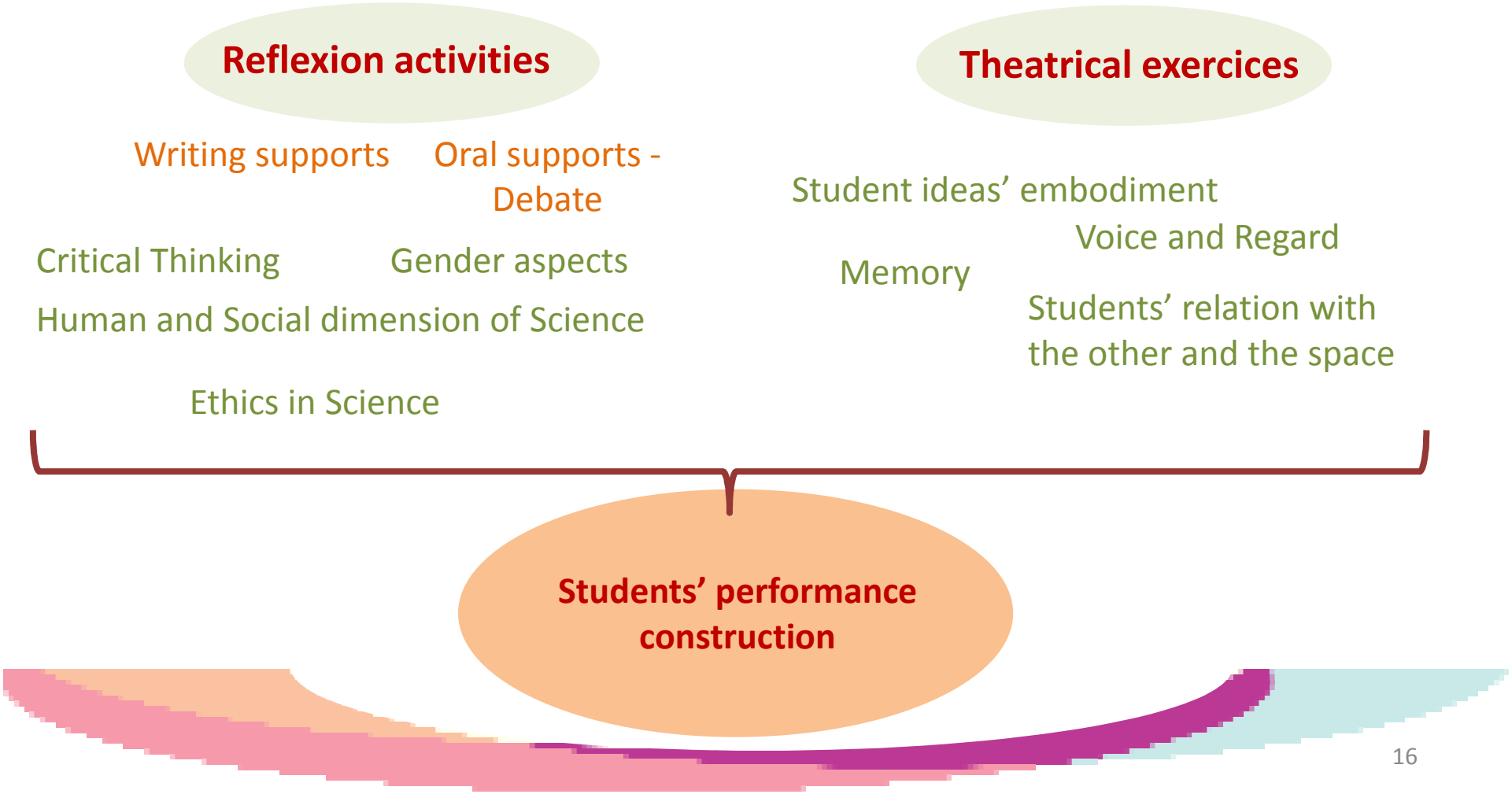
students' creative and critical thinking

Students' emotional engagement

students' reflexion on gender & ethical issues

PERFORM Workshops

Each workshop was divided into different activities:



Project Assessment

How and to which extent the structure of these workshops allowed students to get involved in their own reflection about science ?

How did the students engage during the workshops ?

What did they report having learnt during the workshops?

What were the aspects they enjoyed the most during the workshops?

Project Assessment

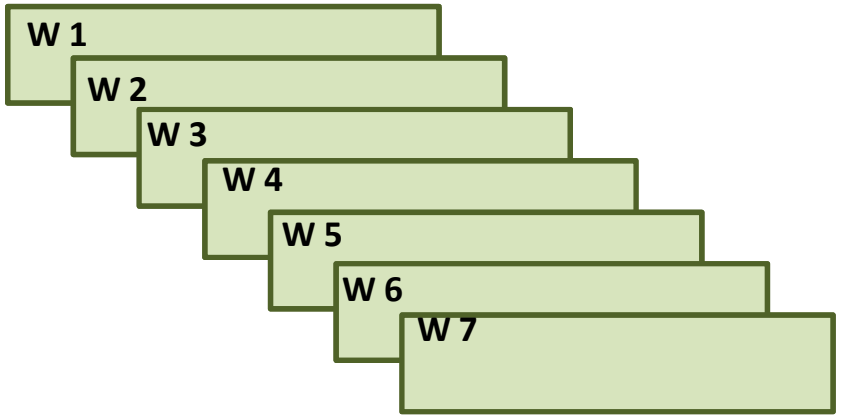
The evaluation used a mixed methods approach:

combining both qualitative and quantitative data

with all the stakeholders involved in the workshops (Students, Teachers, Researchers, Science Communicators)

Project Assessment

Before the workshops	During the workshops	After the workshops	
Students' structured Surveys on their perceptions towards science & science learning	**Systematic & structured Observation** of the workshops	**Students' structured Surveys** on their perceptions towards science & science learning	**Students' surveys** about the workshops
	Students' self evaluation of their learning process		**Students' Focus Group**



Final REPRESENTATION

Teachers' Interviews

Researchers' Interviews

Sc. communicators' Interviews

Main insights

Students' engagement in the workshops

– Balanced participation of all the students thanks to:

- The combination of activities realized in subgroups and activities involving the whole group of students
- The combination of activities of reflection and theatrical exercises

Main insights

Students' engagement in the workshops

- Higher involvement when using oral supports than written ones

- Higher involvement when working on students' own research questions than on other topics approached

Main insights

Students' relation with the young researchers

Students show a high interest towards ECRs' talks and sharing on their research and daily life

Most of them reported they wish they could have more interaction with the young researchers

Most of them reported that interacting with young researcher gave them a broader overview on what might be a scientist

Main insights

Students' perception of the Workshops

*« what did they **enjoy the most** during the workshops ? »*

To realize the theatrical exercises and the final PERFORMANCE (especially in FR)

Main insights

Students' perception of the Workshops

*« what did they **enjoy the most** during the workshops ? »*

To be part of the creation of the Performance and to practice it

Main insights

Students' perception of the Workshops

« *what did they* ***enjoy the most*** *during the workshops ?* ***»***

To have fun as a driver for science learning

> « *I liked that we learnt and had fun at the same time. I've learnt things about science, even me, that I don't like science and normally do not pay much attention*» (Girl, SP)

Main insights

Students' perception of the Workshops

*« what did they **enjoy the most** during the workshops ? »*

To Socialize and to experiment a Collaborative learning

Students reported they enjoyed being able to socialize with their mates and other pupils they did not previously know

"Through performing, group tasks and activities. I liked how we wrote on the sheet the ideas we had and we rotated to different groups to write on their sheets. That made planning our busks easier because we had input from others." (Girl, UK)

Main insights

Students' perception of the Workshops

« *what did they* ***learn*** *thanks to the project?* ***»***

Critical thinking

« *I have learnt that we subconsciously judge people based on looks, gender, and body language* » (UK)

Main insights

Students' perception of the Workshops

*« what did they **learn** thanks to the project? »*

Learning autonomy (reported by the teachers)

In Spain, they emphasised students' capacity to take ownership of the process towards the end and to improvise as some tense situations were emerging, through their capacity to creatively adapt to new situations and be innovative.

Main insights

Students' perception of the Workshops

*« what did they **learn** thanks to the project? »*

Oral Skills

Also recognized by teachers

"This really helped her a lot. Then, I asked them to prepare a text and to read it, and she was the one who read it the best, [...] we could hear her really well, with no grip, and she is dyslexic. This experience really raised her."

Main insights

Students' perception of the Workshops

*« what did they **learn** thanks to the project? »*

Gaining Self Confidence

Also recognized by teachers

Main insights

Contexts that allowed such outcomes

Climate of trust

Fostering dialogue

Use of humour

Attention towards students' needs

Emotional support

No competition

Conclusion

In order to foster students' engagement into science learning through an inclusive way, this process allows us to highlight the importance of:

- Proposing a diversity of practices and approaches fostering students' active learning, and involving the cognitive, physical and emotionnal engagement

- Allowing students' curiosity to be the driver of the process of learning

Conclusion

In order to foster students' engagement into science learning through an inclusive way, this process allows us to highlight the importance of:

- Offering students the opportunity to express their ideas through physical and emotional pathways in a climate of trust, respect and no judgement

Contact

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