



The Art of Science Learning

WP4 Assessment Analysis of Goal 2 Barcelona Case Study

Maria Heras, Karla Berrens, Sandrine Gallois, Isabel Ruiz-Mallén

**Universitat Autònoma de Barcelona
Universitat Oberta de Catalunya**

July 2017



**European
Commission**

Horizon 2020
European Union funding
for Research & Innovation

*This project has received funding from the European's Union H2020
research and innovation program under grant agreement N° 665826*

BARCELONA CASE STUDY – *IES Santa Eulàlia*

GOAL 2: CREATION OF THE PERSEIA

Methodology

As a way to examine the capacity of the workshops for reaching the Goal 2, involving the “performance’s capacity to combine rigorous scientific content with aesthetic quality”, we explored both the scientific and artistic aspects of the monologues performed by students at the school.

To do so, we first collected general information on the context of the performance of the PERSEIA, by considering where it took place, the number of students involved in the each monologue, and the audience. Then, we assessed the final monologues by considering both the artistic aspects and the scientific content.

It is important to note that the artistic aspects have been approached and understood in the context of PERFORM, that is an educational project fostering students’ engagement with science and therefore, our aim is not to judge the artistic quality of the PERSEIA in a broad sense.

In this line, we first applied as assessment criteria those artistic elements identified by the science communicators and communicated to the students while creating their PERSEIAs. Three elements had been introduced through the workshops: i) narrative, as those narrative elements of the monologue (clear structure with an introduction, presentation of research question/s, climax and ending connecting again with intro and research question), ii) charisma and presence, based on embodied elements and humour (voice, look, body language, group listening), and iii) content of the monologue (described below). Furthermore, we also looked at students’ use of performing resources, such as the use of space, light, music and attrezzo; and the engaging capacity of the monologue, as students’ ability to connect with the audience (e.g. students are attending to the monologue and engaging, find it humorous, etc.) and to generate a dialogue afterwards.

The assessment of the scientific content included: i) the weight scientific content took into the PERSEIA; ii) the accuracy and rigour of the scientific content transmitted through the monologue, and iii) the clarity of the communication of such scientific content.

In this document, we first introduce the overall highlights of both schools and main recommendations, as main common results. We then present the results for each school by introducing the context in which the monologues were performed by the students, and the observations of the artistic elements and scientific content of the PERSEIAs played by each subgroup of students.

OVERALL HIGHLIGHTS

- Differences were observed in both schools regarding the performing context and general atmosphere. While in Terrassa a stage was provided with audiovisual support (music in-between PERSEIAs and a projector) and students were generally enthusiastic, in Castellbisbal students' mood was more polarised and their performances were not supported with audiovisuals.
- In both schools, a strength of the PERSEIAs was their humouristic dimension, which was successfully achieved by students and clearly managed to engage the audiences.
- In both schools, an aspect to improve was the integration and development of scientific content (beyond the introduction of definitions). In some cases, the scientific information provided also lacked rigour.

INS SANTA EULÀLIA, TERRASSA

HIGHLIGHTS:

- A generally enthusiastic atmosphere was observed, both in the performing students and in the audience. The presence of a stage, music and the TV seemed to help students get in the mood.
- Humour was present in almost all the monologues, engaging the audience of students which was listening enthusiastically and clearly enjoying the show. In this regard, the PERSEIAs were successful, as students managed to introduce humour, overcoming some initial concerns about their capacity to do it.
- The performing students showed a very engaged capacity while performing their PERSEIAs: they were interacting with the audience, most of them were fluent in their speech and when they got stuck, they continued with a very professional attitude.
- Most of the monologues lasted between 1,30 and 2 minutes and were in a presentation-like format (oral communication), while 2 monologues applied further performing elements, such as small sketches, to help communicate their story.
- An imbalance was sometimes observed between content-focused monologues (which developed accurate scientific contents but in a rather conventional oral-communication format) and monologues based on humour and other performing resources (with a lack of scientific content, however).
- With a few exceptions, the scientific content was generally accurate, but scarce and not much elaborated through the PERSEIA. Scientific contents were addressed superficially (mostly by providing a definition), as a way to spark the interest of the audience without further developing.
- However, 4 out of the 8 monologues developed a bit more their scientific content and one monologue introduced gender. Among these monologues, 2 were approaching the ECRs topic (nanoscience).

Context of performance

The PERSEIAs were performed on a Friday morning, during class time, at the school's main acts room, a big space which had a platform similar to a small scenario. As the whole class was involved in the project (4º A & B), PERFORM students performed their monologues in front of an audience of about 80 students from the year below (3º ESO) and five teachers, including personnel from the direction team. The local TV attended the show to generate a piece of news, which caused excitement among the students.

There were 8 subgroups of 3-4 students each performing the monologue¹.

In terms of general use of artistic resources, there was a big screen at the back of the platform with PERFORM and BigVan logos and music was used at the beginning and end of the show and in-between the PERSEIAs to introduce the different groups.

The show was introduced by two girls that played as presenters of the show. They prepared a script for the presentation of the monologues, introducing the topics and including some jokes. They looked confident and used the space by moving around the scenario.

At the end of the show, Daniel Erice (theatre director and science educator, member of PERFORM's advisory board) went up on stage to congratulate the students and provide them an external view of their monologue. It was an encouraging feedback that appreciated their capacity to enthusiastically engage the audience of peers, while at the same time teaching them things about science. Helena and Oriol also closed the event with very appreciative words and recognising the students for their effort done.

Group 1: Nanocapsules

Three girls and 1 boy performed this PERSEIA. The girls had clearly more weight in the monologue, as the boy only said one sentence. Although the monologue lasted only 1,20 minutes, it was a good example of a PERSEIA, due to the combination of performing elements and scientific content.

Artistic aspects

Girls in stage were present and charismatic: they applied humour and talked to the audience in a conversation-like manner, with growing confidence as the monologue evolved. At the beginning, they got stuck at some words (they were the first group performing), but they kept on with their lines, in a very professional attitude. Two of them had specially a performer attitude, moving on the stage and enjoying making jokes. In contrast, the boy just said a short sentence at the end, with a joke.

No further performing resources were used, as the monologue followed a talk format.

Also, the monologue had a clear narrative with a catchy introduction and a well-defined question at the beginning (*what are nano-capsules?*), which was answered through the

¹ The student with autistic traits did not perform, he was among the public (his group had been dissolved that day).

monologue, creating an engaging story. The public seemed engaged, they followed the story with attention and were laughing to their jokes.

Scientific content

Students accurately introduced the definition of nano-capsules in the monologue, together with some of their uses in medicine. They used some metaphors (disguised with humour) to help the audience understand the concepts, without missing the scientific information. Although the scientific content was not elaborated in a lengthy way (the monologue was short), it had clearly a weight in the PERSEIA, as it vertebrated the story introduced and opened and ended the story.

Group 2: Melanin and Racism

This group included 3 girls and 1 boy performing. One girl did not perform. One girl from another group also participated punctually, as a sort of collaboration (*cameo*). The monologue lasted 2,10 minutes.

Artistic aspects

This group included acting and students used the whole space of the scene to move around and were performing with a clear performer attitude (presence, vocalisation, staying in their role). Humour was present throughout the whole monologue.

The first girl performed the role of a rich woman from Dubai sharing a story about her neighbours (one black and one white). The other two girls jumped then in stage and shared a couple of (racist) jokes, also performing. The narrative was then controlled by a boy, who held a TV command and could stop the action (girls remained frozen). He introduced then the concept of melanin and told the girls he was there to illustrate them, so they don't remain ignorant. They briefly argue until he stops action and one girl stops him too, showing that girls could also control him.

The narrative elements seemed to be more clearly developed at the beginning than at the end, as the ending was poorly worked in comparison with the rest of the monologue.

The audience was engaged, laughing and following the story.

Scientific content

Students accurately introduced the definition of melanin and the difference between black and white people. However, no further (scientific) content was provided and no connection was made to any research question. The monologue was mostly standing upon the comic content and the jokes. Since the ending was not much elaborated and the jokes were racist, there was no clear message or conclusion approaching the topic of research.

Group 3: The mystery of decomposition

This group included 2 girls and 1 boy. They all partake in the performance, although the boy and one of the girls have more weight. However, the girl who talks less in the PERSEIA was the one leading the creation process during the workshops.

Artistic aspects

Students were fluent in the presentation of the monologue, which unfolded in a presentation-like format, without further theatrical or performing resources. The narrative is well structured, starting with a research question contextualised in students interests and further

explanations and examples that answer the question. There is also a touch of humour from time to time that engages the audience.

Scientific content

The students introduced the explanation of the Redi's experiment, after their research question. They are meticulous in their description, which is well-elaborated, and provide examples. Due also to the clear narrative structure, the message is clearly articulated and communicated to the audience.

Group 4: The dangers of mobile phones

This in the single group composed only by boys (3 boys performing). Two of them played a secondary role introducing the play, and one of them developed the main character. The monologue lasted about 2 minutes.

Artistic aspects

The monologue included a short theatrical sketch in which students acted as if they were in the street playing with mobiles. Although the two students acting at the beginning were shy, they played fluently and with presence on stage. The protagonist seemed confident and comfortable in his role, he moved through the stage and clearly had a performer attitude (charisma). Humour was present all the way through the PERSEIA, engaging the audience and the narrative followed a clear structure with a clear conclusion and ending.

Scientific content

The protagonist provided a brief explanation of electromagnetic waves, integrated in the narrative. They also explained the concept of "no-mob-phobia" (no-mobile-phone phobia), as the extreme dependence of mobile phones and contextualized the information provided in their own daily experiences. However, it lacked rigor in its scientific communication, as the main scientific-based message was that scientific journals showing that mobiles produce cancer are not true, simplifying research in this regard to a point that can induce confusion and misinformation.

Group 5: Sports, better with music

Three girls out of the 4 integrating the group performed in the PERSEIA. The monologue lasted 2 minutes approximately.

Artistic aspects

The monologue followed a presentation-like format in which humour was not much present and no use of the space or other resources was made. Still, the students provided a very clear and well-structured narrative, including all the elements highlighted by the facilitators. The audience seemed engage.

Scientific content

The PERSEIA clearly and accurately developed scientific content, which clearly vertebrated the monologue. Students first introduced the topic of music and its influence on our emotions and

the body, to then articulate a research question. They further combined daily life examples (going to the gym and the influence of music) with information about different treatments based on music for specific illnesses to answer the research question, which enhanced the communication of the scientific content introduced.

Group 6: Alcohol

This group included 3 girls, although they did not all correspond to the original group. It lasted 2,30 minutes.

Artistic aspects

Students were clearly making an effort in stage, since they were partially improvising due to an internal conflict in the group that changed its composition in the last minute (see GOAL 3). In this regard, they seemed more unsure than other peers and hesitated a bit about the contents and whether the monologue has ended or not. When talking, they were focused on the audience, while they seemed less present or more uncomfortable when listening their peers. The monologue introduced a clear question (what are the effects of alcohol in our brain?) but it lacked a clear narrative and a structure (no clear end was provided, for instance). It relied mostly in teenagers' humour about alcohol and general perceptions, rather than on the development of contents, which were introduced without much connection to the main story.

Scientific content

The monologue did not develop or communicate clear scientific content, as it basically mentioned the types of alcohol and that it affects the brain, without further explanations or developments connected to the questions raised. There was a message (alcohol is bad and we should stop drinking), but it was not connected to any scientific content or the group research. Similarly, at the end, one of the girls introduced a couple of sentences about the most consumed alcohol, but it was rather disconnected from the story. However, since this monologue was partially improvised, we cannot assess whether it reflected the research work carried out by the group.

Group 7: Lab-on-a-chip

This group included 2 girls and 1 boy. 1 girl did not perform. The monologue lasted 2,30 minutes.

Artistic aspects

The monologue followed a clear narrative, with all the relevant elements included: they started from a very clear research question contextualized in a common situation (what do we mean by lab-on-a-chip?) and continued providing information about it and different examples. Students knew their text and had made a clear effort in performing, as two of them reported to be shy students (especially the boy, with learning difficulties). One of the girls engaged more in performer-attitude, showing charisma while making questions to the audience, while the two other students were rather following a traditional oral-communication format. There were no further performing elements applied during the monologue, and no humour or acting was applied. Still, the audience was engaged and followed the monologue.

Scientific content

Scientific content was clearly and accurately developed in this monologue (one of the most developed). It approached the topic of lab-on-a-chip, defining this technology and explaining its uses and relevance. Very interestingly, they contextualized the information within a current research project, introducing a specific research lab in Boston and the names of different researchers, including a young woman. Furthermore, the monologue also included the topic of gender, through references to the role of women in science and their struggle to be recognised. They included a mention to Marie Curie and Vivienne Hek.

Group 8: Protein smoothies

One boy and one girl performed, while two students did not perform (also 1 boy and 1 girl). The monologue lasted 1 minute approximately.

Artistic aspects

The monologue included some narrative elements, as it started with two questions to the audience provided some information to answer them and ended with a conclusion. However, its short length did not allow to further elaborate a story and there was no acting or humour. Both students were present in stage. The boy got stuck at the beginning but he managed to go on, showing a very engaged attitude.

Scientific content

The monologue included the definition of proteins and explained the impact of protein smoothies in our muscle fibers. The information was accurate and also connected to a clear conclusion (it is better to practice sports for developing our muscles than just drinking these dietary complements). However, due to the short length of the monologue, it could not really elaborate the content beyond the sentences shared.

IES CASTELLBISBAL, CASTELLBISBAL

MAIN HIGHLIGHTS:

- Students strived to make the audience engage with the humoristic side of the monologues and that was well achieved.
- Some studies developed short theatrical sketches or applied their bodies to support communication. No further performing resources were used (music, audiovisuals).
- Most groups had a monologue that was too short on scientific information.
- There were a few groups that did not have their information checked and were unfactual.

Context of performance

4t ESO students performed the monologues: 15 girls and 11 boys. There were 9 subgroups of 1-4 students each performing the monologue.

Monologues were performed in front of an audience of students from that same year and the year below at the school's main acts room during class time. The number of people (students and teachers) who was reached was not recorded but it was relatively high (around 70).

In terms of general performing resources, there was a small platform students used as scenario and a projector was plugged in, although instead of projecting an image like in Terrassa, it projected the desktop of a computer, which was all the time projected on students' faces. No music was played in-between the PERSEIAS. One girl introduced the show and was presenting each PERSEIA.

As mentioned in Goal 4 report, students were a bit nervous with the idea of performing their monologues in front of their peers, some only knew about having to perform late in the process. Some of them really enjoyed the experience, while others felt very uncomfortable performing. One group did not want to perform and they did not stand up from the chair to go the stage.

Group 1: Homosexuality is not an illness

This group included 1 boy.

Artistic aspects

One student created a monologue by himself on homosexuality where he argued on the “scientific” basis for homosexuality and defended quite emotionally it is not an illness.

There were no performing resources but the monologue was humorous, with some narrative elements derived from the personal experience.

Scientific content

Observation of this monologue showed that although the monologue was delivered with a lot of passion, the perspective was quite reductionist as determined by hormones. The names of the hormones were wrong and we could see it had not been checked by the facilitators (which they confirmed at a later meeting).

Group 2: A psychopath's mind

This group included 1 boys and 3 girls.

Artistic aspects

The monologue presented the mind of a psychopath. There were no props or atrezzo and students remained very still throughout. This monologue was borderline racist, having jokes on the verge of being of really bad taste, engaging the audience (even if negatively). There is a narrative that is structured but it ends abruptly having no conclusion.

Scientific content

There is data with regards to the nurture/nature of debates surrounding sociopaths and psychologically unstable individuals but it is neither contrasted nor appears verified.

Group 3: Blood and apples

This group included 1 boys and 3 girls.

Artistic aspects

This is a monologue on colour-blindness and the influence of colours in our brains. It is a well structured PERSEIA with a large amount of information and jokes threaded into it. The students try to move around and use the stage, acting. There is an engaging capacity although there is a surplus of information. There are no props. The audience is engaged and laughs but after a bit gets fiddly.

Scientific content

Students provided extensive and accurate content on the explanation of colour-blindness, the relationship between colours and the brain and its use in publicity. Verified information that is quite large for a monologue.

Group 4: Technology

This group included 2 boys and 1 girl.

Artistic aspects

This group does not want to perform and they need to insist them as initially only 1 boy goes up into stage. There isn't charisma in this monologue nor are there any props, narrative or acting: the girl briefly reads a paper (she does not understand the writing) and one of the boys makes a joke about iPhones. The third boy does not participate although he is on stage.

Scientific content

There is no story, just the joke, and therefore there is no scientific content.

Group 5: Subliminal messages

This group included 2 boys and 1 girl.

Artistic aspects

There is charisma and a clear structure, the monologue is organised around a sketch at the cinema and it is funny both in terms of bodily jokes and more mental jokes. The students move around the stage and act, getting into differentiated roles. They also include a couple of video-clips and lots of movement on stage and use of space and "imagined" things.

The audience is engaged and laughs.

Scientific content

The scientific content was accurately addressed. It was the explanation of what are subliminal messages and their effect on the brain. The information is clear and pertinent.

Group 6: Renewable energies

This group included 2 boys and 1 girl.

Artistic aspects

There isn't much charisma in this monologue nor are there any props or acting, they read a same paper they pass along. There isn't a story per se nor is there a clear narrative.

Scientific content

Extremely brief content but true and verified.

Group 7: Hallucinogen drugs

This group included 2 girls (1 not performing) and 1 boy.

Artistic aspects

This monologue has a lot of charisma, the jokes are well thought even if they get a bit mixed up during the performance. There needs to be a better connection between intro and middle

point, there needs to be a conclusion. There are no props and one of the girls does not come to perform (she remains in the audience because she says the monologue is not ready).

Scientific content

Content is correct in terms of rigour but brief and could have been better developed and explained.

Group 8: What would you do to win?

This group included 2 boys and 2 girls.

Artistic aspects

The monologue has some narrative elements, no acting, few humour and revolves around a story of a cyclist that was said to use doping. There is charisma and room for improvement but the jokes are well done. There are no props, students stay put for the monologue.

Scientific content

The scientific content is correct on doping but there needs a little bit more of development in order to complete the monologue.

Group 9: Future

This group included 1 girl.

Artistic aspects

This is a great monologue, the narrative is very well worked and combines element of science with jokes that engage the audience and makes them think with humour. The story is tied together streaming from an imagined future where pollution has made life almost impossible. Then through examples, the girl explains pollution and greener living. There are no props but she moves around stage and uses her body to convey the message.

Scientific content

The scientific content is good, well explained and tailored to fit the rest of the story, it is hands down the best monologue of this series. We can see she has worked her information well and has integrated scientific information to a narrative that is easy to follow. The audience is very engaged.