D3.1.x TBVT show

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| Version & Date: | **V1 25/05/2016** |  | Approved by: |  |

Table of Contents

[1 Introduction / Demonstrator Identity 6](#_Toc450047467)

[1.1 Subject Domain 6](#_Toc450047468)

[1.2 Type of Activity 6](#_Toc450047469)

[1.3 Duration 6](#_Toc450047470)

[1.4 Setting (formal / informal learning) 6](#_Toc450047471)

[1.5 Effective Learning Environment 6](#_Toc450047472)

[2 Rational of the Activity / Educational Approach 7](#_Toc450047473)

[2.1 Challenge 7](#_Toc450047474)

[2.2 Added Value 7](#_Toc450047475)

[3 Learning Objectives 8](#_Toc450047476)

[3.1 Domain specific objectives 8](#_Toc450047477)

[3.2 General skills objectives 8](#_Toc450047478)

[4 Demonstrator characteristics and Needs of Students 9](#_Toc450047479)

[4.1 Aim of the demonstrator 9](#_Toc450047480)

[4.2 Student needs addressed 9](#_Toc450047481)

[5 Learning Activities & Effective Learning Environments 10](#_Toc450047482)

[6 Additional Information 15](#_Toc450047483)

[7 Assessment 16](#_Toc450047484)

[8 Possible Extension 17](#_Toc450047485)

[9 References 18](#_Toc450047486)

# Introduction / Demonstrator Identity

## Subject Domain

Physics, biology, chemistry, arts

## Type of Activity

High school, secondary. Local level (Spain)

## Duration

1 hour 30 min – session 1

1 hour 30 min – session 2

## Setting (formal / informal learning)

Informal learning, this activity is designed to be performed in a theatre (session 1) and a room (session 2)

## Effective Learning Environment

Arts-based

Dialogic space

Communication of scientific ideas to audience

# Rational of the Activity / Educational Approach

## Challenge

Students have a negative perception towards science: it is difficult, boring and only suitable for few. Our challenge is changing this perception showing the reality of science: how a scientist looks like, what is a scientist actually doing, what are the possibilities of working in science. And at the same time making it entertaining. In a second session students explain science in their own language.

## Added Value

Students have the possibility of interacting with scientists through an open questions session after the performance. In this interaction discussion is open and questions like “how do you become a scientist”, “what is your field of research” are always raised. For most of the students this is the first time they see a scientist, they interact with a scientist and they can actually ask a question to a scientist. Previous work during the performance is intended to break barriers with students and shorten the distance between audience and scientists.

# Learning Objectives

## Domain specific objectives

* Learn about specific topics in science: biology, physics, chemistry mainly.
* Relative to particle physics: learn how collisions are produced, what are the goals of a big accelerator, importance of density of energy in a collision.
* Show specific up to date researches in 4 fields of science.
* Learn about non-verbal language

## General skills objectives

* Break stereotypes
* Demystify science and scientists
* Shorten distance between students and scientists
* Open a channel for dialogue students-scientists
* Women role in science
* Interdisciplinary: between science and arts, and between different fields in science
* Communication skills

# Demonstrator characteristics and Needs of Students

## Aim of the demonstrator

To explain recent developments in science using scenic arts and the stand-up format, this way science is presented in a more attractive way to students. The final dialogue aims to create an open channel of discussion student-scientist. Students learn by IBSE model to explain science in their own way

## Student needs addressed

* Learn science in a more attractive way
* Satisfy curiosity
* Role model, students see a real scientist
* Possibility to express their worries and questions about science career, scientists and also developments in science.
* Capacity to communicate science

# Learning Activities & Effective Learning Environments

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Science topic: Science in general, particle physics in particular  (Relevance to national curriculum)  Class information  Year Group: High School (3º 4º ESO and 1º 2º Bach)  Age range: 14 - 18  Sex: both  Pupil Ability: All inclusive | | | Materials and Resources  *What do you need? Performance requirements : stage, micros, sound equipement, projection*  *Where will the learning take place? On site or off site? In several spaces? (e.g. science laboratory, drama space etc), or one? Theatres and event halls*  *Health and Safety implications? None*  *Technology? Not necessary*  *Teacher support? To control students in the room and accomodation* | | | | |
| Prior pupil knowledge  **Not necessary** | | | | | | | |
| Individual session project objectives *(What do you want pupils to know and understand by the end of the lesson?)*  During this scenario, students will learn about individual topics in science (mainly in particle physics, but also biology and chemistry), will have the chance to interact with scientists and will connect science with arts. In a second session they will apply what they learnt and explain a scientific topic with their own words. | | | | | | | |
| Assessment  **Interactions with students during and after the show. Use of Social Nets** | | **Differentiation**  *How can the activities be adapted to the needs of individual pupils?*  The Q&A part can address individual needs | | **Key Concepts and Terminology**  **Science terminology:**  **physics, chemistry, biology**  **Arts terminology: Dramatization of science, performance** | | | |
| Session Objectives: learning in a creative and attractive way, taking science out of the classroom  During this scenario, students will learn about science and interact with scientists. | | | | | | | |
| Learning activities in terms of CREATIONS Approach | | | | | | | |
| **IBSE Activity** | **Interaction with CREATIONs Features** | | | | **Student** | **Teacher** | **Potential arts activity** |
| **Phase 1:**  **QUESTION:** students investigate a scientifically oriented question | Students pose, select, or are given a scientifically oriented question to investigate. *Balance and navigation* through *dialogue* aids teachers and students in creatively navigating educational tensions, including between open and structured approaches to IBSE. Questions may arise through *dialogue* between students’ scientific knowledge and the scientific knowledge of professional scientists and science educators, or through *dialogue* with different ways of knowledge inspired by *interdisciplinarity* and personal, embodied learning. *Ethics and trusteeship* is an important consideration in experimental design and collaborative work, as well as in the initial choice of question. | | | | Students choose a scientific topic that he/she finds interesting. Some videos are displayed to inspire the decision | Teachers are provided with models of what the activity is intended to teach | **Scientific questions are distributed among the groups. Students must collaborate to explain the aswers in a dramatized manner.**  **In groups students find similar scientific questions on their own** |
| **Phase 2:**  **EVIDENCE:** students give priority to evidence | Students determine or are guided to evidence/data, which may come from *individual, collaborative and communal activity* such as practical work, or from sources such as data from professional scientific activity or from other contexts. *Risk, immersion and play* is crucial in *empowering* pupils to generate, question and discuss evidence. | | | | Students are oriented towards different source of information, trying to order the data as it answers different questions: how? When? What for? They start creating a story | Explaining a scientific topic in the form of a stand-up show is a challenge. Teachers must give orientation to help ordering the ideas | **Flowchart or conceptual map with the ideas coming from the previous investigation** |
| **Phase 3:**  **ANALYSE:** students analyse evidence | Students analyse evidence, using *dialogue* with each other and the teacher to support their developing understanding. | | | | In groups students analyze the data and discuss a possible structure to guide the script to be played from the introduction to the conclusions following a story | At each step ideas are presented to the coordinator to give orientation and discard ideas that probably take to no-end situations. |  |
| **Phase 4:**  **EXPLAIN:** students formulate an explanation based on evidence | Students use evidence they have generated and analysed to consider *possibilities* for explanations that are original to them. They use argumentation and *dialogue* to decide on the relative merits of the explanations they formulate, *playing* with ideas. | | | | Using evidence students formulate the explanation. Final explanation has to be linked to the story they are creating | Teachers help discarding no scientific ideas | **Connected ideas are displayed in a map that takes from the initial question to the final answer** |
| **Phase 5:**  **CONNECT:** students connect explanations to scientific knowledge | Students connect their explanations with scientific knowledge, using *different ways of thinking and knowing* (‘knowing that’, ‘knowing how’, and ‘knowing this’) to relate their ideas to both disciplinary knowledge and to *interdisciplinary* knowledge to understand the origin of their ideas and reflect on the strength of their evidence and explanations in relation to the original question. | | | | Scientific knowledge related to the topic is presented as input to each group. Groups have to find a way to connect their idea with the ideas given. | Motivate new ideas not presented to the group. Try to link the efforts of the different groups together |  |
| **Phase 6:**  **COMMUNICATE:** students communicate and justify explanation | Communication of *possibilities*, ideas and justifications through *dialogue* with other students, with science educators, and with professional scientists offer students the chance to test their new thinking and experience and be *immersed* in a key part of the scientific process. Such communication is crucial to an *ethical* approach to working scientifically. | | | | Each group complete the story they have been creating during the session to be presented in front of other students in the form of a stand up show. | Orientation to complete the story in the classic form: introduction – content – conclusion. | **The activity itself has a lot of art potential** |
| **Phase 7:**  **REFLECT:** students reflect on the inquiry process and their learning | *Individual, collaborative and community-based* reflective *activity for change* both consolidates learning and enables students and teachers to balance educational tensions such as that between open-ended inquiry learning and the curriculum and assessment requirements of education. | | | | After the session (once all groups have presented their play) an Q&A session is open | Teachers guide the Q&A phase so that the whole process (7 phases) is clear |  |

# Additional Information

N/A

# Assessment

Students and teachers will evaluate the demonstrator using questionnaires (independent for teachers and students)

# Possible Extension

The stand-up script produced by students on a science topic can be played with us. It would be an interesting possibility since students could serve as an element to even shorten distance between the performers (scientists) and the audience (students)

# References