Protocol

EW1- STEM market: The role of entrepreneurial and multidisciplinary research careers in labour market

THE BIG VAN THEORY

Contents

Protocol

Addressed Topic: STEM careers in labour market

Duration: 50 minutes.

General Objectives:

1. To understand if young people associates studying a STEM career with good jobs in the future.

Description of the EW:

Organize students in groups of 3 or 4 people. Minimum: 4 groups.

This EW is composed by two sub-activities:

1. Best Job Ever

Specific Objective: To understand which are the characteristics that young people appreciate in a hypothetic good job.

Implementation:

- Each group has to list the 5 features that their ideal job has. They have to write each one in a post-it (one characteristic per post-it). No more than 10 minutes are needed.

- Each group has to list their 5 ideal jobs for the future. Give the students 5 to 10 minutes to think about it. The jobs chosen by each group will be written in the blackboard, organized by columns (one column for each group of students). Take a photo of the blackboard with all the jobs chosen by the students (or write them down).

- Compare the jobs listed and choose the 4-5 most popular ones. Clear the blackboard and write the selected 4-5 in a same row.

- Allow the students to put the post-its with the characteristics/advantages under the job written in the blackboard that best fits with the characteristic. Take a photo of the blackboard with all the post-its.

- Decide, by consensus with all the students, which is the best job.

2. What did they study?

Specific Objectives: To understand which careers young people associate to "Famous People".

Implementation:

- Project the pictures of the "STEM_MARKET" power point.

- After each image, ask what the students think that the person in the picture.

- Let each group answer once per picture.

- Take notes of what students answer for each picture

- Explain to the students the real studies that the person in the picture did.

Material Needed:

post-its, blackboard, projector.

Data collection protocol for EW1: see figure 1

Basic information about the group & workshop	
Workshop name	
Facilitator/s	
Date & time	
Teacher attending (if any)	
Number of participant students	Total:
	Boys:
	Girls:
Students' age	
Name of the school	
FG Name	

Activity	Students' responses	Facilitators' observations
Sub-activity 1- Best job ever	Attach the picture of the blackboard with the preferred jobs selected by students	
	Write down the most popular jobs (4-5) Job 1: Job 2: Job 3: Job 4: Job 5:	
	Attach the picture of the blackboard Job 1: Job 2: Job 3: Job 4: Job 5:	which are the most valuable characteristics that an employment has to have for students (highlight in bold left)? Which is de best job chosen by students (highlight in bold left)?
Sub-activity 2- What they studied	Take notes of what studies the students answer for each picture P1- Angela Merkel: P2- Lionel Messi: P3- Maria Bianchi Prada: P4- Joanne Rowling: P5- Shaquille O'Neal: P6- Taylor Swift: P7- Greg Graffin: P8- Mark Zuckerberg P9- Mayim Bialik:	

Figure 1: Data collection protocol for EW1

Guidelines emerged from EW1

After delivering EW1 in the PERFORM project, the following guidelines emerged. These can be followed to generate a performance play that deals with STEM jobs.

G1: STEM JOBS
To highlight that science and STEM-Jobs are everywhere: ✓ An excavation, an electoral survey, an architectural studio, a plane, an engineering company, the zoo, a football team, in science communication events
To highlight STEM-Jobs features that young people consider positive: ✓ Travelling, helping others, having a flexible schedule, involving hands-on activities, reducing injustice
To highlight that some well-considered jobs are actually STEM-Jobs: ✓ Architect, airline pilot. Take into account local particularities

How to apply EW1 guidelines

It is a challenge to make students aware of STEM jobs are everywhere, so they can understand the importance of studying science and technology, not only during secondary school but also in higher education. The perspective of many students is that a STEM career gives you the possibility of doing research in a lab or teaching science, but they are not aware of the different jobs in which STEM knowledge is needed. To overcome this lack of information about STEM jobs, PERFORM implemented specific actions throughout the PERSEIAs. For instance, TBVT PERSEIA opens with a one minute video showing four scientists working in their own labs (that happens to be the performers themselves) and explaining briefly their own disciplines: physics, biomedicine, chemistry and biotechnology applied to renewable energy[1].

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[1] This action also follows the General Recommendation "to show a video".

To convey what is being said in the PERSEIA in something relevant for the students, our advice is that performers do not relate to other people's experiences or talk generally. It is much better to personalise what is being said, that what performers explain during the show are their own experiences, authentic and real (even if they are not, this is "performing arts").

During the Spanish PERSEIA, TBVT performers (that are actually real scientists) talk about their own experiences working in science-related jobs, from research to industry:

> … and now look at me. I became an entrepreneur; I created my own company to communicate science. Thus, I work on what I really want to: joining arts and science.

> Finally I became genetic engineer and I can modify genes. To do so I had to study biology and physics.

We are aware that this suggestion will not work for some of the target audiences for this protocol, as they are not practicing scientists (e.g. most science teachers). In this case, a good alternative is to show a video with real practicing scientists.

During EWs in Spain, students underlined some positive features that STEM careers actually have, like traveling or learning foreign languages. In the Spanish PERSEIA these features were highlighted using jokes and relating them to a European Union ERASMUS programme for university students' exchange:

> When you enter University, you will have many chances to travel abroad, as instance, ERASMUS programme. I said ERASMUS, even if you know it with the name of *orgasmus*, sorry for the disappointment

Because students often do not relate some of their "well-considered jobs" with science or technology, do not hesitate to highlight the more scientific and technological aspects of jobs like an entrepreneur, video-game designer or doctor

in your future PERSEIAs. For example, TBVT creates a stand-up scientific monologue talking about the science behind mobile phones and computing language (binary code). You can consult the entire script in Annex 3.

Linking knowledge with the emotional dimension is very effective in capturing students' attention and making relevant what is being told. Through TBVT monologues, PERSEIA students are invited to think in what they really like, in which activity they are confortable, because it will give students' hints about what career they would like to choose. In this case, the performer himself explains, in a funny way, how he decided to study chemistry:

> ...and it is an election season, you have to choose and there are a lot of options. You can do a training cycle, get to work or go to college. Which option do you choose? What is the good one? We at TBVT have it clear. You must choose… what you like!
> In high school I asked myself … Orilo, what do you like the most?
> And I realized that what I was most passionate about was controlling the massive release of energy in short periods of time due to molecular reorganization ... to blow things up! So I chose the chemistry career. And it was a success, because as I chose what I liked, when I got to university I met people like me, I discovered that I was not alone, I made many friends.

A good way to catch the attention of the audience is to use graphic examples close to the students. In the busking PERSEIA, SMS tells students about the need to mix science, engineering and math to save arms, legs, and even lives, in children's playgrounds. They made an interesting experiment, asking two volunteers to throw two eggs against the ground. One of them fell on a bubble wrap surface and did not break, while the other shattered on the ground. The egg that survived did so thanks to the joint work of mathematicians, scientists and engineers, showing that STEM jobs are everywhere (even playgrounds), while highlighting their most positive characteristics.

> Now my good pal Nikki from Cardiff University tries to work out how to save our arms and legs (and lives!) by pulling people up to the ceiling on a rope, dropping them and seeing what happens when they hit the floor! And I need 2 volunteers to help me do just that? Thank you so much for volunteering, but really our insurance

would never let us drop anyone from such a height, but amazingly I have 2 volunteers here who have both signed a piece of paper saying its fine to drop them! They are called Eggwood and Eggweena

Busker hands the eggs to the volunteers and gets them first to drop the eggs onto a super soft floor (bubble wrap) and then on to a hard floor.

Nikki and her medical engineering pals use their science and maths skills to create super soft floors in play grounds to prevent what just happened to Eggwood and Eggweana happening to us! Science and engineering are everywhere, playgrounds are full of them!

And no matter how many times things don't work out (a lot!) Nikki and her pals keep on dropping things, keep on gathering evidence and thinking. Persistence is important as a scientist!