Science and public engagement

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ABSTRACT

Over the last decade, social media has changed our way of communicating, both privately and professionally. Science has also been overwhelmed by this abrupt change. Today’s calls for national and international projects require a strong commitment also to the public engagement. A good practice of science and public engagement can be a benefit for a scientific career, an opportunity for young people who want to approach this profession, and not less an important rawplug in the relation with politics.

There is one thing that all scientists have to deal with: their grandmothers will never understand what they are working on. It is a hard task. The love for a grandmother can make scientists overcome this issue, a friend’s carefreeness can justify that in 10 years he/she has not yet understood, but what we, as scientists, cannot accept is that society and government bodies do not understand the scientist work and its relevance for society itself.

Public Engagement (PE) in science was born with the aim to close the gap between the scientist’s work and the perception that common people have about it. PE is intended as the involvement of specialists listening to, developing their understanding of and interacting with non-specialists.

If a pharmaceutical company is going to market a product, it will launch an advertising campaign aimed to promote the product’s value and benefits. Likewise, PE is the kind of publicity that science should do to explain to the people the value and benefits that they can gain from science, if appropriately used (Figure 1). The difference being that there is no need to keep it out of the reach of children. Indeed, even children should make a daily use of it.

I assume that everyone has seen at least a TV show in which a young lawyer succeeds in exposing a corrupt politician, or saves the world from the shady interests of a multinational company. Likewise in our imaginary and in Hollywood movies there are plenty of beautiful and talented doctors working every day at the forefront to save lives. However, we all know that the daily task of most of the lawyers and doctors are routine, simply because it is statistically highly probable that each one of us knows at least one of them. And so, though fascinating on the big screen, we know that a lawyer will handle simple divorces, or cases for car accidents, and a doctor will deal every winter with simple colds. But now let us ask ourselves: what does a teenager know about the scientist profession?

Unfortunately, scientists have to compete with an unfair comparison at the highest level, because the first word that a teenager connects to science is ‘Einstein’, ‘Da Vinci’ or ‘Galilei’. And TV is not helping science, as most of the movies and series depict a strange world, made of creative, crazy and weakly connected with the reality people. It is difficult for a teenager to have a real picture of the job of a scientist. And it is probably true that he or she has never met one is his/her life (Figure 2).

In a time of high unemployment, society has the responsibility to inform young people about the career opportunities that come from studying science, which has different outlets, such as academia, research, industry, education, banking, insurance and scientific communication in general. The channels that the society has to inform are varied. The first is definitely in high school, which has the task of inserting science in the spectrum of studies and careers that a young person can take. But it is not easy for the school to well describe and suitably present such specific professions. Just as it would not be easy to explain the work of a geneticist or an astronaut.

Inspiring young people to get closer to the study of science and promoting the relevance of PE are indeed two of the priorities of several societies. We will review here a couple of them.
Figure 1. Flames, one of the most feared natural phenomena, is governed by simple physics laws. Explaining them to the general public allows people to intervene consciously, whether it is needed, in case of fire.

Figure 2. Meeting a scientist during the growth allows children to understand their work efficiently through the game. With a simple wheel a scientist can explain them the conservation laws of the angular momentum, and the bicycle dynamics.
Founded in 1916, The Optical Society (OSA) is the leading professional association in optics and photonics. OSA members dedicate their time and talents to the society through volunteer service in a variety of activities. These volunteers play a critical role in shaping the programming, publications and products offered by OSA, and in setting the profession’s standard of excellence. On the other hand, serving as an OSA volunteer offers rewarding professional development and networking opportunities. PE is definitely a rewarding volunteering activity. This system applies to adult members as well as young ones. OSA supports an extensive global network of more than 350 student chapters. These chapters, managed for and by students, create valuable opportunities for professional development and foster lasting relationships between peers and mentors. Many chapters are heavily involved with community and youth education outreach (Figure 3), both to provide a service to their community and to disseminate the knowledge of optics and photonics worldwide [1]. OSA Student Chapters receive many benefits including: activity and travel grants, guest lecture resources, networking opportunities, and much more.

Something similar is run by the European Physical Society (EPS). Born in an era without the Internet and pdfs, during the social upheavals in 1968, EPS is a non-profit association whose members include 42 national physical societies in Europe, individuals from all fields of physics and European research institutions. As a learned society, the EPS engages in activities that strengthen ties among physicists in Europe. Being a federation of national physical societies, the EPS studies issues of concern to all European countries relating to physics research, science policy and education. EPS has always recognised outreach as the most effective tool for the PE. On one hand outreach allows EPS to attract young people to the study of physics, on the other to replenish its members pool guaranteeing the generational change.

In 2010, the EPS launched the Young Minds project [2] that has the goal to promote the study of physics to the next generations of physicists. Young Minds uses the energy and talents of young physics students to carry the message of the wonder and impact of physics to members of their local community (Figure 4): other university students, the general public, elementary schools, etc. In fact, young physicists can become ambassadors of this message, which explains how the study of physics is fundamental to our society. It is not easy to quantify if and how this project might have influenced young people on the choice of physics as a profession, and perhaps we could never measure or

**Figure 3.** Reflection and refraction at the air–water interface during the outreach activity ‘Physica in Fabula’, a mixture of literature and physics: the reading of a brief literary step is matched with simple experiments aimed at explaining the physical phenomena animating the story.
calculate it. But it is certain that Young Minds allows the contact we are speaking of, it allows people to meet a physicist and understand that you do not have to be Einstein to start this profession.

PE can ensure that a young person with a predisposition to science can come into contact with this community to understand what it is. So, without delegating to television fantasies, PE activities for schools and general public can provide this contact, and show how useful science research is to our daily lives. Just think of how liquid crystals changed the screening options, or how the LASER has changed the way we communicate, or how optical fibres have allowed for laparoscopic operations, or as the need to analyse and share large data amounts has given rise to what we now call the World Wide Web.

Nowadays, in the social media era, all the scientific communities have to get out of their metric space and face the challenge of talking to non-specialist. Anyway, there is a paradox that constantly accompanies PE in science and technology: the increasing number of ways citizens can learn about science is not always been matched by any increased level of scientific knowledge among the citizens themselves. Thinking about liquid crystals, despite there are hundreds of outreach activities run by the LC community, despite every human (at least in the western world) wears a liquid crystals display owning a mobile phone, human beings able to explain its behaviour are less than the ones able to explain why Messi is considered the best soccer player ever. What looks strange is that I make this comparison without ever having seen Messi playing soccer, be it live or on television. However, it is a collective assumption that you know even without having been publically engaged.

The awareness of the importance of the PE is moving in the world of science and research, and it will be thanks to PE that the next generations will know the elementary particles name as well had they already know the Pokémon ones.

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