SISSA – International School for Advanced Studies
ISSN 1824 – 2049

Comment

SOCIALLY INCLUSIVE SCIENCE COMMUNICATION

Straight into conflict zones, scientific research empowers the minds

Leïla Perié[1], Livio Riboli-Sasco[1] and Claire Ribrault[1]

ABSTRACT: *Sharing scientific knowledge in conflict zones may not sound as a priority. Still science communicators can contribute to address social issues by inviting people to experience the research practice, engaging them in scientific questioning and constructive dialog.*

Do nails grow at the same speed on each finger? Why does the moon seem to move with us as we walk at night, while stars stay still? Why, as girls, do we have to cover our heads? These questions were raised by kids in 2013 in Palestinian schools, during questioning workshops we facilitated[2] during the Science Days of Palestine. Through these workshops, young Palestinians questioned their environment and daily experience, including the ongoing regional troubles, and were guided to seek for rational answers by themselves. This is the same very first step as in any scientific journey. Such questioning scaffolds research practice, together with rejection of arguments based on authority and criticism of established ideas based on reproducible proofs. We contend that these practices shared by members of the research community are similar to those that grounded our modern democracies. Thus, letting people experience scientific research and its values can be used as a tool for empowerment. This is particularly relevant whenever the target population is experiencing poverty, segregation, ongoing conflicts or their aftermath, and needs to collectively find answers to their problems. In this context, we take advantage of the relative neutrality of science, while having a realistic vision of science. We acknowledge that scientific research is not ideal and is also affected by misconducts and ethical abuses. Scientific research coexists with other knowledge systems, which altogether guide societal choices. However scientific questioning invites us to adopt intellectual attitudes that prevent from running straight into emotional conflicts. 10 years of experience support our claim and we foresee that this "tool" has an untapped potential. It can be implemented by practitioners of scientific research, from natural sciences

[1] All authors contributed equally, ranked by alphabetical order.
[2] How to stimulate open questions?, workshop tools.

and humanities, and actors from scientific institutions. For example, science centres and museums could contribute to address social issues, by inviting youth and citizens to experience scientific investigation [1, 2].

We first experimented this approach when creating the *Science Académie* program.[3] It offers internships in research labs to high-school students from impoverished suburbs of France. We select participants based only on their motivation, in order to reach those who may not fit with the school system but express great curiosity. During a week, mentored by PhD students, they take part in the daily life of the lab (experiments, data analysis, lab meeting, coffee breaks, etc.). This provides a transparent vision on the way research proceeds, both in terms of pure management and intellectual challenges. Evaluation of this program revealed that some participants show empowerment as they set up NGO's, become social entrepreneurs or join political action. Though we lack a control population to rigorously demonstrate efficiency of this program, these empowered participants cite participation to *Science Académie* as a key determinant of their social commitment. Following these internships, they are offered the possibility to perform science communication workshops in a festival in France[4] or abroad. We observe that sharing passion for science with a wide audience strengthens self-confidence on a long term.[5] This approach gets close to what the Exploratorium in San Francisco has been doing since 1969,[6] with its explainers being recruited among youth who have abandoned their home or dropped out of school. Using research-based activities to empower people is complementary to other approaches addressing social and political issues: for instance, in 2009 in Vukovar — a Croatian city where young Serbs & Croats still live quite apart — we performed research-based activities which fruitfully combined with sport and theatre activities.[7]

Although we consider research-based activities to be relevant to address exclusion and conflict, these activities need to be finely tailored to each context: there is no ready-to-use universal "tool". This shall not be understood as a limitation, but rather as a fantastic driver for innovation in science communication and science education. For instance, we are experimenting at a European scale a process of co-creation of new fundamental research programs. The co-creation involves professional scientists and citizens, youth and adults, in particular from poor or isolated communities, such as *favelas* in Lisbon suburbs.[8] In addition, it should be noted that going towards populations living in conflictual or deprived areas does not imply simplification of scientific knowledge for mere entertainment or cultural purposes, but rather sharing the essence of the production of this knowledge. It allows new knowledge to be produced, meaningful for these communities. Incidentally, this approach, far from requiring technological or fashionable tools, merely relies on old-style genuine human interactions.

[3] Science Académie: http://www.scienceacademie.org.
[4] Festival in France: http://www.paris-montagne.org.
[5] Bilans: http://paris-montagne.org/science-academie/bilans.
[6] Program overview: http://explainers.exploratorium.edu/highschool/program.
[7] http://www.con-sol.org.
[8] Nouveaux Commanditaires — Science: http://www.joursavenir.org/ncs/en.

In order to engage more communities into a similar path we have performed capacity-building workshops for community educators, teachers, and university students from Europe and Middle-East.[9] One crucial aspect highlighted in these workshops is the absolute necessity to involve active researchers. Indeed the process relies on mobilizing the values that are at the core of the research practice and kept alive by the research community. These researchers shall also be trained to avoid a "deficit model" stand and to face skepticism when communicating their involvement in conflict zones to their institutions. In addition, developing such activities also requires lots of patience, for both scientists and participants to scaffold an indispensable reflexivity about science. Last but not least, we must be careful when claiming to promote social inclusion. Claiming its achievement too early may lead to disappointment, and damage the necessary trust relationship with the targeted communities. Hopefully standard schemes of evaluation shall be produced in the next years, as more initiatives may take place.

We will close this brief note with the words of Albert Camus, "one must imagine Sisyphus happy". Even if strengthening peace in conflict areas is a difficult task, the community of science workers can have an impact through research-based activities, maybe small, but which will be bring some happiness for those involved.

Acknowledgments

We thank Matteo Merzagora for inviting us to publish this article. This work has been done with our close collaborators Anne, Bojan & Antonin, the teams of Paris-Montagne and ConSol Croatia associations. We are grateful for the support of Fondation de France for the Nouveaux Commanditaires - Sciences activities.

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Authors

Leïla Perié is a researcher in immunology at the National Cancer Institute in Amsterdam. She has a Ph.D. in immunology and an engineer degree in food science. Since the beginning of her scientific career, she is involved in science communication through various NGOs (Paris Montagne, Consol, etc.), focusing on sharing research pratices to promote

[9] We have performed these in Vukovar, Cairo, Barcelona, Palestinian West-Bank, Belgrade, Göteborg, Vienna, Bremen.

social inclusion. She has developed and performed several trainings on these topics in Europe and Middle East. She is a co-director of the Atelier des Jours à Venir (AJA) together with Claire Ribrault and Livio Riboli-Sasco. E-mail: leila@joursavenir.org.

Livio Riboli-Sasco is a theoretical biologist who decided to move beyond the constraints of the formal academic system to be free to merge research, innovative teaching and mediation in science in society projects. He engages in this mix of activities within the Atelier des Jours à Venir non-profit cooperative company that he co-founded. From 2010 to 2012, together with Anne Le Goff he headed the process of creating a fully innovative Bachelor program at Paris Descartes University, a program that is socially inclusive. In 2005, Livio Riboli-Sasco created Paris Montagne Association. For nearly ten years he has committed with friends and colleagues to open the research system and science to those who are excluded from it. He also introduces students in political science curriculum to scientific research, discussing the various challenges that the community is facing (from lack of inclusion to lack of reflexivity). E-mail: livio@joursavenir.org.

Claire Ribrault is a co-director of the Atelier des Jours à Venir (AJA), which she co-founded after her Ph.D. in biology. Together with members of the AJA, she develops innovative teaching approaches at the university level based on the research practice, with a strong emphasis on the human dimension of research; she also facilitates dialogue between citizens and researchers in order to empower them to become active and creative members of their communities. E-mail: claire@joursavenir.org.

HOW TO CITE: L. Perié, L. Riboli-Sasco and C. Ribrault, *Straight into conflict zones, scientific research empowers the minds*, *JCOM* **13**(02)(2014)C05.