

Comment

Debating as an educational method to science and citizenship

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Do we really have to engage in a debate about science? Is science really related to citizenship? Briefly illustrating what is currently occurring in the field of science communication, I will attempt to answer those questions and I will introduce some instruments that the Museum of Science and Technology “Leonardo da Vinci” in Milan has adopted to involve the citizens in the public scientific debate during a training course for teachers and in the new format *Fatti un’opinione* (Form your own opinion).

Many newspaper pages are devoted to scientific debates; the relationship between science and society has been debated from various points of view: sociology, science communication, scientific research, funding programmes. The involvement of non-expert citizens in the public debate of science is a key element in the temporary relation between science and society. The one-way transmission model between those who possess a scientific knowledge and those who, as an empty container, must be filled with knowledge has not proved effective. As shown by the shift from a Public Understanding of Science to a Public Engagement with Science and Technology, the active involvement of the citizens in science plays a fundamental role.¹

The European Union, through the Lisbon strategy (<http://europa.eu/scadplus/leg/it/lvb/n26021.htm>), has pointed out as a priority goal the construction of an economy based on knowledge, founded on the citizens’ active participation. Part of the Seventh Framework Programme devoted to the relationship between science and society (Capacities, part 5) aims at encouraging the democratic debate with a more concerned and informed public and at offering better conditions to favour collective decisions on scientific issues.

The conflicts arisen over topical scientific issues (biotechnologies, stem cells, in vitro fertilisation) have shown that the simple consultation of the citizens, through Eurobarometer surveys, is not enough anymore. Decisions on topical subjects that affect everybody’s life should not be made any longer exclusively by politicians or scientists – even referendums are not enough –, they should rather involve actively the citizens, and a public debate is a good instrument for involvement. The Danish Board of Technology has suggested, since the 80s, some effective instruments to encourage the public debate on technology, to spread the results of the technologic research, to report the will of the citizens to the Parliament and to involve the citizens into the democratic process and in the decisions on scientific issues.²

On the other hand, it means that a modern democracy wants informed citizens who are also able to debate; now that non-experts have entered the arena of science, they should be able to actively participate and to make their voice heeded and respected. Hence, it is necessary to be able to examine information and to be able to debate over that information – in order to play a role and influence decision-making in the scientific field. Consequently, science and citizenship today are highly interdependent and, if we want to actively participate in the decision-making process in the scientific field, if we want to be citizens today, we need to be able to discuss about science and to illustrate our point of view.

Moreover, science itself can strongly contribute to democratic processes. Indeed, criticism is a fundamental component both in democracy and science. Both science and democracy are a method, a mental attitude, and are founded on the ability not only to support our statements, but also to listen to, debate and refute ideas that differ from ours.³

For all of these reasons, science is related to democracy and citizenship and consequently debating is a crucial instrument both to science and democracy and to citizenship. In this relation between science and society, museums are strategic players in favouring the access to the scientific knowledge and to explore

critically the scientific issues under discussion. A Museum aims at encouraging the public to access the scientists' knowledge, and to critically examine scientific research and the relevant issues.⁴

Indeed, a museum "should present itself as one of the places – and one of the most important – in which the new *scientific citizenship* is created, at all of its different levels".⁵

In this reference context, the Museum has experimented in cooperation with a group of teachers a training workshop on biotechnologies aimed at illustrating informal debate techniques inspired by familiar board games and techniques to make decisions on the basis of information on topical scientific issues.

Aside from understanding scientific phenomena and direct scientific experimentation, young people are more and more required, as citizens, to be able to debate and select information. School, in cooperation with a museum, can significantly contribute to preparing young people to act as citizens. The games are taken from the *CitizenScience* programme of the British science centre At Bristol (<http://www.at-bristol.org.uk/cz/teachers/Default.htm>). The programme aims at involving students and young people in the debate over scientific issues regarding biomedicine that have an impact on today's society.

The games we chose to be tested with teachers in Milan were *Il taboo delle biotecnologie*, *Parole in discussione* e *Decisioni difficili* (Biotechnologies Taboo, Words under Discussion and Difficult Decisions). The training workshop schedule included an hour devoted to each game and 20 minutes devoted to the debate on the results. With *Il taboo delle biotecnologie*, words were all connected to biotechnologies (for example: gene or allele, but also Frankenstein and Dolly). *Parole in discussione* was more focussed on the expression of one's own ideas: indeed, the players have to put some controversial words on a scale from natural to artificial in order to represent their point of view. The selected words were insulin or biotechnologies, in order to show that the categories 'artificial and natural' of the common sense can be hardly applied to contemporary science. In *Decisioni difficili*, teachers had to select the families that are eligible to avail themselves of in vitro fertilisation as a free service and support their choices. The selected cases focussed on ethical issues, such as whether homosexual couples should be allowed to avail themselves of in vitro fertilisation.

Teachers have highly appreciated the games, although they have stressed that time constraints often force them to adopt more traditional knowledge transmission methodologies, based on standard lessons. Furthermore, the main concern of a teacher is often to carry out the school programme and therefore any new activity should find a specific position within the school curriculum.

There are various types of games with various purposes; some may help teachers to focus words or concepts in classes (*Parole in discussione*), others may help to debate on one's own ideas and to reveal beliefs or misconceptions existing among young people (*Parole in discussione*), others still to make young people identify with decision-makers as regards issues related to science and technology and the assessment of costs and benefits of each decision (*Decisioni difficili*). As a general rule, all of those games are very useful to involve young people with science, to make them understand that science is really part of our life when we choose whether to eat GMO food or to have a baby through assisted fertilisation. But, most of all, science has more and more social and ethical implications; hence, as previously mentioned, it is important not only to be informed on science, but also to understand its implications and make informed decisions. Other goals achieved through those games are: enhancing young people's information, developing the abilities of expressing one's point of view and illustrating one's knowledge to other people. Teachers considered the games as a method to "give classes while students do not even realise it", in order to create attention and interest towards science, a good method to let the young people's pre-knowledge emerge and to present science in a more everyday and entertaining way. The training workshop has achieved one of the fundamental goals the Museum had set: showing how we build a *scientific citizenship* in various ways, reading newspapers or even playing with board games. Also through trivial instruments such as the mentioned ones we can contribute to training citizens involved in science and who may want to improve decision-making processes about scientific issues.

The game *Parole in discussione* was also tested during the training course for teachers within the SEDEC "School, Science and European Citizenship" project, which took place in February 2007 in Lagos (Portugal) in cooperation with the Centro de Formação Dr. Rui Grácio. Even in this international setting the games were highly appreciated by the participating teachers. Another instrument adopted by the Museum to favour the dialogue between experts and citizens on scientific issues that affect society is

the new format “*Fatti un’opinione*” (Form your own opinion). “*Fatti un’opinione*” involves the visitors through action and spurs them to think, discuss, and become aware thanks to experimental activities, free questions and the words from the experts. The experimental activities in the interactive laboratories and the meetings between experts and the public have the purpose of sharing knowledge and experience between scientists and citizens. The next points on the agenda of the “*Fatti un’opinione*” project will deal with other topical scientific issues: stem cells, DNA and privacy, food.

These experiences show that today museums are places where it is possible to meet people, debate and make experiments to better understand the reality we live in every day and thus to build a new *scientific citizenship*.

Translated by Massimo Caregnato

Notes and references

¹ Nico Pitrelli, *The crisis of “Public Understanding of Science” in Great Britain*, JCOM 2 (1), Marzo 2003 <<http://jcom.sissa.it/archive/02/01/E0201/>>.

² consensus conference, S. Joss, J. Durant, *Public Participation in Science*, Science Museum (1995).

³ Boncinelli, *La scienza è democrazia*, Corriere della sera, 8th February 2007.

⁴ D. Chittenden, G. Farmelo, B.V. Lewenstein, *creating connections: museums and the public understanding of current research*, Alta Mira Press (2004).

⁵ M. Merzagora, P. Rodari, *La scienza in mostra. Musei, science centre e comunicazione*, Paravia Bruno Editore (2007).

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