Part 1 of 5

Science communication: from information to dialogue

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What is science communication?

Science communication is an umbrella term covering a wide variety of activities including professional communication by scientists; interactions between scientists and members of the public; media representations of science; and the ways people use scientific knowledge in their own lives (Mellor & Webster, 2017). The study and practice of communicating science has a long history (Guenther & Joubert, 2017). Public debates about scientific issues are increasingly widespread and prevalent, involving politicians, journalists, and citizens groups (Brown, 2015; Corner & Hahn, 2009; Sarewitz, 2011).

Consequently, there is now a growing expectation that scientists communicate their findings and provide public access to their data, and an awareness among the scientific community that being a scientist often involves much more than simply conducting research according to the scientific method (NASEM, 2017). The global March for Science events (held during the first half of 2017 in response to widespread concerns that scientific funding, culture and method are increasingly under attack) are just one high-profile example of the central role that is now placed on communication, outreach and engagement by the scientific community.

The field of science communication – research and practice – is characterised by a multiplicity of approaches (Carvalho et al., 2016; Corner & Hahn, 2009; Kuhberger, 1998; Lakoff, 2010; Moxey et al., 2003; Pearce et al., 2015; Rothman et al., 2006) and a dense literature.

The different approaches include:

- A substantial philosophical strand on science as an epistemology (Knowles, 2003; Chalmers, 1992; Kuhn, 1970; Popper, 1959), with the unique position of the scientific method in society illuminated by contemporary debates about so-called 'fake news' and 'alternative facts.'
- Competing sociological accounts of how controversy and consensus develop in science (Brante et al., 1993; Collins & Pinch, 1993; Irwin & Wynne, 1996; Dunlap & Brulle, 2015).
- Media analyses of the roles of different groups in the production, communication, and consumption of science (Friedman et al., 1999; Whibey & Ward, 2016).
- Extensive psychological and social-scientific literature on public understanding of a range of environmental science-based topics (Nisbett & Markowitz, 2016), as well as strategies and methods for engaging with publics more effectively (the 'science of science communication' – Fischhoff & Scheufele, 2013; Pidgeon & Fischhoff, 2011).
- Growing interest in environmental and climate change science communication outside of developed nations (Guenther & Joubert, 2017), including South America (e.g. Takashi & Martinez, 2017; Velez et al., 2017) Africa (e.g. De Mulder et al., 2014), China (Chung-En & Zhao, 2016) and India (e.g.Thaker et al., 2017; Olofsson et al., 2017).

From communicating information to engaging in dialogue

A consensus has emerged over the past few decades that effective science communication is not a one-way process - and public controversies about scientific issues are no longer seen as straightforwardly attributable to a lack of knowledge (the so-called 'deficit model' of science communication - Sturgis & Allum, 2004). Instead, effective science communication is increasingly seen to require a two way conversation or dialogue, and is more usefully conceptualised as 'engagement' (Kahan & Carpenter, 2017; National Co-ordinating Centre for Public Engagement, 2017; Parkhill et al., 2013; Corner & Clarke, 2016; Hagendijk & Irwin, 2006; Rowe & Frewer, 2005; House of Lords, 2000; Irwin & Wynne, 1996; Renn et al., 1995).

There is also growing experience of using participatory approaches (especially in the global South) to overcome the social, economic and gender inequalities which undermine efforts to build engagement with the science underpinning sustainable development goals (see Escobar et al., 2017; Burns et al., 2013).

We return to the tension between information provision, dialogue and participation throughout this report, as these themes underpin our analysis of existing literature on science communication, and our recommendations for future directions.

Whilst the accumulated knowledge about communicating and engaging around environmental science topics is well-developed, the field remains far from settled, and considerable challenges remain in terms of public engagement on a number of issues in countries around the world.

Students in a biology class in Illinois. Photo: University of Springfield Illinois

Levels of scientific knowledge among the general public, if measured as simple recall of scientific facts, have remained fairly high over time (Scheufele, 2013), but only one in four Americans in 2014 could explain "what it means to study something scientifically," and only half of Americans (53%)

had a correct understanding of randomised controlled experiments (National Science Board, 2016). Surveys of European publics show that more than half of Europeans have studied science or technology (Eurobarometer, 2014a, p.4), though this figure hides some marked geographical and social differences. In the UK 71% of respondents said they had studied science but only 22% in the Czech Republic. Across the 20 European countries surveyed, 75% of those who stayed in education beyond the age of 20 had studied science. This figure was 24% for those who left school before aged 15. 64% of those who considered themselves high up the social ladder had studied science; this number was 45% for those perceiving themselves as lower down the social ladder (Eurobarometer, 2014a, p.4). Despite the high numbers of people reporting a science education in the UK, most still lack a personal connection with science, or an understanding of how scientists work (HM Government, 2017).

"Public controversies about scientific issues are no longer seen as straightforwardly attributable to a lack of knowledge."

So there remains a collective need to do more to take science to those not currently engaged in order to improve public understanding of the scientific method (Department for Innovation, Business and Skills, 2012). As this report argues though, bridging the science-public gap must follow a process that both reflects the latest social science research on effective public engagement, and remains sensitive to the rapidly changing political context in which science communication takes place.

Full report sections

Access the full report at
https://climateoutreach.org/resources/communicating-environmental-sustainability-science

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