For science communication to be effective it should be evidence based

Effective communication of science to stakeholders across society is a more pressing issue than it has perhaps ever been. Highlighting ways in which science communication as an area of research and practice has struggled to function as an integrated discipline, **Eric Jensen** *and* **Alexander Gerber** *argue that for science communication to continue to develop and deliver impact it has to become more evidence based.*

At its best, science communication can empower research and innovation systems to address global challenges. It does this by improving the relationships with stakeholders in policy, industry, civil society and publics. In so doing, science communication can put public interests at the heart of how knowledge is produced, shared, and applied today, consequently enhancing the benefits of science and technology and mitigating their limitations or risks. For this reason, it is imperative that science communication plays this mediating role effectively. However, to continue to evolve, science communication research and practice need to be more closely aligned and integrated into what we call 'evidence-based science communication'.

Integrating research and practice

The institutional and professional expectations of science communication today extend far beyond the origins of the practice in making scientific knowledge more accessible to the general public. We have both worked in science communication practice and research, especially at the interface between these domains, and have firsthand experience of the complex challenges facing those who seek to translate and develop the infrastructures necessary to translate scientific knowledge into tangible impacts. Ironically, perhaps the greatest challenge facing the field of science communication is a lack of effective communication.

There are high barriers keeping science communication research from being developed and integrated into practice. First, scholarly publications about science communication are scattered across hundreds of specialist (Public Understanding of Science) and non-specialist (e.g. Nature) journals. Second, this multidisciplinary field suffers from inconsistent terminology, making literature reviews and identification of relevant evidence across these hundreds of journals difficult. This adds up to a disjointed field of research where access to the best available evidence is heavily occluded.

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At a content level, few scholarly publications about science communication either attempt or succeed in conveying clearly why and to whom the results matter in practice. Moreover, there are hardly any systematic reviews for specific topics or challenges within science communication to distil the best available evidence in a methodologically robust way, which makes it impossible to find quick, but accurate, information about good practice in science communication. Finally, there are few direct inputs from practice into research, leaving academic science communication to follow a research agenda that is poorly attuned to issues at the coal face of science communication practice.

At the same time, there are also barriers limiting science communication practitioners' (both scientists and full-time science communication professionals) integration of the best available evidence in their work. Many practitioners are neither aware of the existing science communication evidence, nor is the relevance of the research they know about sufficiently clear to be worth the investment of time in seeking more information. This disconnect between research and practice may be rooted in the fact that most science communication practitioners have a natural or physical sciences educational background, while science communication research and practice is firmly set within the social sciences. Social science research and theory is also often encased in jargon, making it difficult for the uninitiated to access. Moreover, using evidence in science communication practice requires a willingness to reconsider established practices in light of the best available evidence; this kind of self-reflection does not appear to be a norm in the science communication field (especially amongst leading institutions).

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> science communication has a major blind spot when it comes to social inclusion

Finally, research practitioners also suffer from the way knowledge about best practice in science communication is dispersed across hundreds of journals, many of which are closed access. Developing understanding of relevant evidence and producing new evidence through evaluation requires know-how that is often inadequately addressed by science communication teaching and training for practitioners. It is also hampered by institutional priorities that disfavour the investment of time and effort in developing knowledge about best practice.

Towards Evidence-based Science Communication

We see great potential to improve science communication through a number of specific changes in norms and practices. First, it is essential that that appropriate and relevant communication skills are developed and applied for a given science communication challenge. This means that the challenge should drive the selection of communication approach, not the (commonplace) scenario of an institution communicating in the way that is most comfortable regardless of the target audience or needs. Second, as has been shown in our previous empirical research, science communication has a major blind spot when it comes to social inclusion, especially regarding socio-economic class of participants (and related factors such as race/ethnicity) in activities. There is no research we are aware of showing the demographic profile of science communicators *per se*, but there is clearly a need for science communication work to be proactively inclusive and welcoming of those who are often marginalised or excluded, both in the development and delivery of science communication activities. There is also a need for a change in science communication norms to prioritise the willingness and capability to reflect on limitations in one's own communication objectives and strategies despite institutional constraints and agendas, even if this may invalidate previously accepted practices. Likewise, there should be a commitment to continually improve practice based on ongoing collection and analysis of evaluation evidence. Essentially, being learning-oriented, focusing on continual professional improvement and sharing of new findings to aid others should become the new normal in science communication.

In practice, evidence-based science communication should combine professional expertise and practical skills with the best available evidence from systematic research. As a first step in this direction we suggest the following principles that could be used to drive positive change in science communication.

11 Principles for Evidence-Based Science Communication

1) **Evidence-based practice:** Increase the systematic use of evidence in science communication practice to maximise effectiveness and forestall negative impacts.

2) **Evidence-based research:** Reduce questionable science communication research practices, avoid preventable methodological shortcomings and increase transparency.

3) **Assessing impact:** Make impact evaluation of science communication a standard expectation in communication and engagement funding with the aim of refining practices based on findings.

4) **Bridging the chasm:** Address the divides between research and practice in science communication to enable an integrated evidence-based practice.

5) **Mutual appreciation and collaboration:** Develop initiatives to encourage both researchers and practitioners to develop mutual understanding about their needs, experiences and unique capabilities and forms of expertise.

6) **Transferability:** Establish more effective mechanisms for exchange that work for practitioners and researchers that transcend the limitations of scholarly publishing.

7) **Recognising applicability:** Both research and practice need incentives to engage and collaborate. More applied, or at least practice-relevant, research also requires more systematic analysis of the needs for research from the perspective of science communication practice.

8) **Revisit the raison d'être for science communication:** Promote important societal values such as social inclusion, good ethical practices and democratic participation through the design of science communication initiatives.

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9) **Systematic reviews:** Produce practical guidelines to effectively inform and orient practice by distilling the best available evidence in a methodologically robust way. This should also foster replicability and replication for key topics by making methodological transparency the norm.

10) **Systemic change:** Encourage informed decision-making in the selection of science communication approaches for particular settings and circumstances, backed up by funding review processes that insist on evidence-informed approaches.

11) **Certification:** Encourage the next generation of leaders in evidence-based science communication through certification processes and standards in teaching and training.

This post draws on the authors' paper, Evidence-based Science Communication, published in Frontiers in Communication. An audiobook version of the paper and a discussion of implications by the authors can be accessed at: sciencecomm.science.

Note: This article gives the views of the authors, and not the position of the LSE Impact Blog, nor of the London School of Economics. Please review our comments policy if you have any concerns on posting a comment below

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