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Editorial: Helping scientists to communicate well for all considered: Strategic science communication in an age of environmental and health crises

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Editorial on the Research Topic

[Helping scientists to communicate well for all considered: Strategic science communication in an age of environmental and health crises](#)

As the scale and scope of environmental and health crises increase, it is essential that scientists communicate with a diversity of stakeholders and audiences ([National Academies of Sciences, 2017](#)). Inclusive science communication is exceptionally critical for engaging diverse audiences in scientific research and ensuring equitable applications of scientific research to meet societal needs ([Polk and Diver, 2020](#)).

Despite the clear need for inclusive science communication, many practicing scientists have no formal public engagement training ([Brownell et al., 2013](#)) and there is no uniform, comprehensive approach for effective public engagement ([Scheufele et al., 2021](#); [Weingart et al., 2021](#)). There is also a considerable gap between science communication practitioners and researchers ([Han and Stenhouse, 2015](#)). As a result, scientists' public engagement efforts risk being more reactive than strategic, and may result in unintended consequences (e.g., [Ma and Hmielowski, 2022](#)).

This special issue includes 12 articles that examine inclusivity in science communication and public engagement. These articles explore inclusivity within the context of science communication training programs and practices and exemplify how social scientific and rhetorical approaches can be used to increase inclusivity in public engagement practice.

Training for inclusivity

King-Kostelac et al. (2022) outline a Science, Technology, Engineering, and Medicine (STEM) graduate student training program at the University of Texas San Antonio that was designed to enhance the public engagement component of student thesis research with direct training in inclusive science communication. Their case study demonstrates the effectiveness of designing thesis research with inclusive science communication in mind, and the importance, especially for minoritized students, of a facilitated peer-to-peer model for such training.

Kimbrell et al. advocate for inclusive public engagement strategies and offer The American Association for the Advancement of Science (AAAS)'s Center for Public Engagement with Science and Technology as a model for other institutions. Their article details how the Center facilitates inclusive and accessible dialogue between scientists and publics through public engagement training informed by AAAS's Public Engagement Framework.

Fähnrich et al. propose a new "competence model" for science communication training programs, with a specific focus on the skills that are required to communicate with a diversity of audiences in an increasingly digitized science communication ecosystem. Their research draws on the experiences of science communication professionals who participated in the EU-funded RETHINK project, as well as the curricula of 13 science communication degree programs in Europe.

In their Perspective, Callwood et al. describe how science communication operates within and normalizes a White supremacy culture, and how science communication training can perpetuate this culture. They argue that science communication trainers are well-situated to dismantle White supremacy in science communication, STEM, and society, and aid in systemic change. They provide four core themes for action that build on the Key Traits of Inclusive Science Communication, and provide a concept map for co-creating Inclusive Science Communication that is authentic and culturally competent.

Kago and Cissé focus on how language barriers function as key obstacles in making public science communication and engagement more equitable and inclusive. They reflect on how public understanding and confidence can be enhanced by using local languages in a variety of African settings, ranging from courtrooms to classrooms. They call for a much wider adoption of African indigenous languages in settings where science and its publics meet, with a focus on using regionally relevant languages.

Social scientific approaches

Capers et al. experimentally examine the effects of science communication training courses taken by STEM graduate

students. Among other things, the results suggest trainees' jargon use declined, and their movement of hands and hesitancy during talks was correlated negatively with audience ratings of credibility and clarity, and smiling was correlated with improvement in credibility, clarity and engagement. Overall, they show how objective tools can be used to measure training program success through audience feedback, multiple textual analysis tools, and body language analysis.

Osman and Ogbunugafor provide a framework for science communicators to combat the start and spread of misinformation when it comes to public health and other scientific issues. Based on an epidemiology analogy, they argue that this framework is especially applicable for historically underrepresented communities who may not trust scientific institutions and where there may be indirect means of misinformation.

Nogueira et al. explore the challenges of relying on the diverse worldviews, expertise, and interests of scientists and stakeholders as they co-produce knowledge. The authors reflect upon their experiences with the practical and methodological challenges stemming from knowledge co-production research projects. They discuss the role social scientists can perform in such projects, providing a critical, reflexive lens, and a safeguarding role of the process they engage in while working with scientists and stakeholders in the co-production of knowledge.

Rhetorical approaches

Grady et al. examine how STEM communication initiatives can be improved from rhetorically-informed approaches to writing. The authors develop, implement, and assess 2 context-dependent science communication writing rubrics, which they argue function as rhetorical boundary objects. They identify four specific facets of "good" STEM writing—(1) connecting to the big picture; (2) explaining science; (3) adhering to genre conventions; and, (4) choosing context-appropriate language—the authors thus offer a cross-disciplinary analysis for STEM administrators and funders.

Harrington et al. test a rhetorically-informed model of science communication training, "SciWrite," which focuses on encouraging habitual writing for multiple genres and audiences, and continuous peer-review of written science communication. Using the interdisciplinary SciWrite rubric, the authors find that science graduate students who are trained in SciWrite score higher across all assessment categories, suggesting that writing quality is best explained by a critical understanding of higher-order writing skills.

Patenaude and Bloomfield conducted a rhetorical analysis of 12 semi-structured interviews with nuclear scientists and engineers to better understand their perspective on nuclear energy and public engagement. Among other things, they demonstrate how the deficit and dialogue models function

within the context of nuclear experts' perspectives on risk and safety, government regulation and public policy, and public education and engagement surrounding nuclear energy. They argue for increased dialogue and collaborative engagement between public stakeholders and nuclear experts.

Finally, McGreavy et al. explore how interdisciplinary and rhetorical approaches to communication can help illuminate the ways in which communication shapes transdisciplinary collaboration and knowledge co-production. Based on an ethnographic research project in Maine that focuses on the development of environmental DNA science for coastal resilience, they find that definitions of eDNA, perspectives on communication, and constructions of audience and expertise work together to shape the knowledge co-production process.

Summary

From documenting evidence-based science communication training programs to examining issues of intersectionality and inclusivity in science communication, each of the 12 articles in this special issue offers a unique perspective on science communication, public engagement, and inclusivity. The case studies of training programs provide helpful lessons learned that have broad applicability. The descriptions of how social scientific and rhetorical approaches have been used to enhance inclusive science communication offer new insights into more effective science communication practices. Our hope is that, taken together, these articles will inspire improvements in our collective ability to more effectively and equitably apply scientific research to meet societal needs.

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Author contributions

BS led the creation of the editorial. MA, MJ, IL, and SM wrote initial drafts of multiple article summaries, edited the editorial draft, and conducted a final review of the editorial before submission. All authors contributed to the article and approved the submitted version.

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Conflict of interest

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