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Comment

DO WE KNOW THE VALUE OF WHAT WE ARE DOING?

The problems with science communication evaluation

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ABSTRACT: *Even in the best-resourced science communication institutions, poor quality evaluation methods are routinely employed. This leads to questionable data, specious conclusions and stunted growth in the quality and effectiveness of science communication practice. Good impact evaluation requires upstream planning, clear objectives from practitioners, relevant research skills and a commitment to improving practice based on evaluation evidence.*

The editorial in this issue raises key questions about how we can know whether science communication is successfully delivering something of value to publics. High-quality impact evaluation that is judiciously employed, skillfully conducted and effectively shared can provide a basis for practitioners to discover what aspects of science communication initiatives are working, in what ways, with which audiences and why.

It is true, as the editorial states, that "science centres and museums have been to the fore in designing and implementing visitor surveys and other evaluation procedures, intended to inform and improve their own practice". However, 'industry-standard' visitor surveys and evaluation procedures at such institutions offer a catalogue of basic errors and poor practice in survey design, sampling and analysis. Indeed, I have used examples from leading science communication evaluation consultants and institutions in my university teaching on social research methods to demonstrate poor practice in survey design and inferential reasoning.

A review of summative evaluation reports produced by numerous U.K. museums concluded that evaluation "evidence used to suggest learning or particular forms of learning can appear fragile at best" [1]. Poor-quality evaluation has been feeding questionable data and conclusions into the science communication system for years.

Science communication institutions are generally uncritical consumers (and producers) of evaluation research, quick to believe that measuring complex outcomes can be simple. Want to know whether a child has learned a lot about science after her day at the science museum? Easy! Just ask her: "Did you learn during your visit to the science museum today?": Yes or No?

London's famous Science Museum has its own audience research team, and yet its internal guidance for evaluation includes the following flawed survey item: "To what extent do you agree or disagree with the following statements?" (strongly agree to strongly disagree): "I have learnt something new today" [2].

Measuring science learning, attitudes and other key outcome variables is not actually this simple. When our hypothetical child above says 'yes' to the self-reported learning question, she is most likely telling the institution what it wants to hear. This question imposes the unrealistic expectation that respondents can accurately assess their pre-visit science knowledge, identify any gains or losses that occurred during the visit and correctly self-report their conclusions on a five-point scale. Actually measuring learning requires (at minimum) direct measurement of visitors' thinking or attitudes before and after the intervention.

An even more common line of problematic evaluation practice in science communication involves asking teachers or parents to report on learning or other outcomes on behalf of their pupils or children. For example, the visitor 'impact survey' commissioned for the Edinburgh International Science Festival asked adult respondents, "What score would the children in your party give this event/activity(s) out of 10?" [3]

How could the answer to this question possibly be accurate if the friends and parents are just speculating about what the children in their party would have said? Indeed, as this question could apply to multiple children, what are the respondents supposed to do if some of the children in their party detested the science festival and others loved it? Moreover, it is entirely unclear how this ten-point scale is supposed to be interpreted by respondents: what does a '5', '7', or '9' signify? This kind of poor survey design would not be accepted in an undergraduate sociology seminar, yet it is routinely used by consultants and practitioners boasting decades of experience working at top science communication institutions.

Beyond such basic methodological flaws, key lines of enquiry within science communication evaluation, such as non-visitors, long-term impacts, data collection beyond the physical confines of the science communication site and the possibility of negative impacts, are routinely neglected within science communication evaluation [4]. This neglect occludes the vision of science communication as a field of practice by hiding vital information necessary for improving inclusion, impact and audience experience.

Many excuses are offered for the widespread lack of quality in science communication evaluation. For example, the fiction that 'evaluation' and 'research' are completely different entities is used to excuse science communication evaluation's widespread failure to live up to research standards.

This false distinction between providing practical guidance (the averred limit of 'evaluation') and developing generalisable knowledge about audience reception of science communication (the averred preserve of 'research') is promulgated by even the best science communication evaluation consultants [5]. In truth, evaluation is just one type of research framework, which focuses on whether a set of objectives have, in fact, been achieved. There is every reason to expect both knowledge and practical guidance to emerge from the same well-designed impact evaluation.

Good impact evaluation requires upstream planning and clear objectives from practitioners. Moreover, results should inform science communication practice. It also requires training (either externally provided or self-taught) in relevant social scientific research methods (e.g. survey design).

Beyond such improvements to science communication evaluation methods, it is also important to keep an eye on the bigger picture. Are science policy-makers and institutions setting goals for science communication that are appropriate? What kinds of science communication-related outcomes are being valued and why? Are systematic exclusionary practices being embedded in science communication institutions? Whose interests are being served by the current emphasis on instrumental science communication outcomes such as inculcating pro-science attitudes in children, as opposed to more open, democratic ideas such as equipping scientific citizens for deliberative engagement?

These are important questions that can only be addressed in limited ways by impact evaluation conducted at the project level. Rather, these questions require reflection on theory and research from science and technology studies and a broader interdisciplinary milieu. Critically analysing the goals, methods and audiences for science communication as a field should supplement good science communication evaluation. Working in concert, quality impact evaluation and critical self-reflection by practitioners could be used to counteract stagnation and systemic failures in science communication practice.

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