Classification scheme to quantify patterns of discourse about public engagement in disciplinary scientific journals

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Introduction

Scientists routinely share their research approaches and results in their discipline's peer-reviewed journals. Their work can include engaging with the public in ways that can encourage deep thinking, build trust, and deepen understanding for both scientists and the public (e.g., Needham et al. 2009, Peterman et al. 2017, Bell et al. 2019). It is not well-known if and how scientists publish about their public engagement with science (PES) activities[1] and related strategies, perspectives, and outcomes in their discipline's peer-reviewed literature. Such dissemination could normalize and advance public engagement activities among scientists who might not read articles in journals devoted to science communication and education.

We developed a classification scheme to quantify the prevalence of PES discourse in the ecological literature with the intent of promoting such exchanges among scientists. The classification scheme consists of five general types (PES Reflection, PES Synthesis and Opinion, PES Embedded in Research, PES Research, and PES Training and Resources), and thus may be used in other segments of the science literature. In this resource, we provide guidance for coupling our scheme with a formal literature review to identify and quantify PES discourse within a scientific discipline.

Methods

1. Define public engagement with science and select a scientific discipline for your review

For our review, we defined PES activities as "any time a scientist seeks to communicate about a scientific topic outside of a formal educational setting with non-scientists who are not friends or members of his or her family" (from Besley et al. 2018). This broad definition allowed us to focus on evidence of PES activities without attempting to assess the effectiveness of the interaction, which was not possible via a literature review.

For our study, we chose ecology because (1) our team was familiar with the ecological literature, and (2) socioenvironmental factors affect phenomena regularly studied in ecological research, and ecologists often directly or indirectly interact with stakeholders. This was supported by 2016 survey data indicating many ecologists participate in engagement and therefore would have engagement experiences to publish on (unpublished data from Besley, Dudo and Yuan; also see Besley et al. 2018a, 2018b).

Guidance: Review the public engagement and communication literature to concretely define "public engagement with science" for your review. Choose a scientific discipline of interest to explore the extent of discourse about public engagement with science (PES).

1. Note that public engagement with science has varied definitions (see this document for a review).

2. Determine boundaries for the literature review

We used the Web of Science and included articles, reviews, editorials and letters in journals within this index. We chose three search terms—engagement, communication, education—because we felt they were sufficiently broad to capture the different ways authors might refer to engagement without biasing the results towards any particular engagement formats (e.g., public presentation, science festivals). To determine an appropriate time period, we first examined use of these terms in the top 100 ecology journals listed by the Clarivate Analytics InCites Journal Citation Reports. We found a steady increase in usage of the terms beginning in the mid to late 1990s, and thus selected a 20-year window (1998 to 2018). We repeated this search with the five journals published by the preeminent U.S. ecology association (Ecological Society of America) and found a similar trend, suggesting that these journals were representative of the broader ecology literature. These journals are well known, publish content applicable a wide range of ecologists, and do not focus on a specific sub-discipline (e.g., forest ecology). We used these five journals and the 20-year window to identify documents (articles, reviews, editorials, and letters) that have one or more of the three search teams in their title, keywords, or (if available) abstract using the Web of Science search engine.

Guidance: Determine an appropriate time period for your search. Select a set of journals that are well-known by scientists across the discipline, avoid those focused on a specific sub-discipline. Pick a set of search terms aligned with PES activities that will provide a reasonable number of published documents from the formal literature. Finally, use an appropriate search engine for your discipline for the literature review, including selecting the type of publications for your review (e.g., research articles, book reviews, editorials, letters, monographs).

3. Classify documents from the literature review

We first scanned abstracts of the 306 documents returned in our Web of Science search of the five ecology journals, and removed documents not focused on PES activities (e.g., those focused on communication among research and communication between non-human organisms). We then used “consensus coding” to review the abstracts of the remaining 113 documents (we read the entire document if it lacked an abstract). In focusing our review on abstracts, we may have missed descriptions of PES activities in the body of the articles, but captured documents in which authors considered engagement important enough to state within the limited word count of the abstract. Two of us separately read each abstract (or document) and coded it based on the classification scheme on p. 3. We then compared codes and came to agreement about the classification for all instances of disagreement. Finally, we determined (1) the percentage of documents that described PES activities relative to all documents published in these journals and (2) the percentage of each type relative to the total documents that described PES activities. Ultimately, we found only a small minority of ecologists publish about PES efforts, strategies, successes and challenges in journals regularly read by their peers (Stylinski et al. in preparation).

Guidance: Scan abstracts (or entire document if appropriate) to remove any documents that obviously do not address PES activities. Read the remaining abstracts (or entire document if appropriate) and classify using the classification scheme on p. 3.

Classification Scheme

PES Document Type	Definition
PES Reflection	Descriptions of authors' personal experiences participating in public engagement with science, which may include recommendations.
PES Synthesis and Opinion	Descriptions of concepts, frameworks or best-practices relevant to public engagement such as synthesis or opinions of existing engagement-related work, or introduction of new ideas.
PES Embedded in Research	Descriptions of public engagement's role in scientific research (often within Introduction or Methods sections) such as involving citizen science volunteers.
PES Research	Descriptions of original qualitative and quantitative research addressing questions about public engagement (not the discipline's scientific research).
PES Training & Resources	Descriptions of an existing instructional program to support public engagement with science.

References

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