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GUEST EDITORIAL

The Importance of Science Communication

Gee Abraham[1]

I recently left a corporate position at a metallography company to go into business for myself as a freelance STEM writer/editor. I gave 14 years to traditional 40-hour/week roles in an office environment; it was satisfyingly predictable and stable. I dabbled in writing and editing work for a year and a half as a side gig before leaving, and I was surprised to find that I was actually drawn to the unpredictability of it all. Who would I meet and work with? What new ideas might I find? Which projects will bring out my passions, and in what ways? Is there a niche where I can make a difference?

It turns out that there is a need for effective communicators among scientists and other technical specialists. Scientific writing can often get clogged up with technical details and confusing jargon; scientists transfer that knowledge with the hopes of reaching people, but those people can have trouble understanding what it all means. When context is not available, connections are missed, and critical discoveries may remain hidden. Other editors and teachers noted difficulties collaborating with scientists, which was a sure sign that science communication had room to improve.

Scientists communicate constantly—in talks, papers, classrooms, proposals, and elsewhere. I am writing this myself as an editorial board member of this journal, teacher of metallography classes, invited conference speaker, peer-reviewer, STEM editor, blog writer, and published author. Scientists need to communicate for many reasons and in many forms.

With the Internet, science has never been more accessible, and self-publishing techniques have become much more prevalent in the forms of blogs, tweets, video, and others. The 30-second elevator pitch takes too much time now.

Video clips automatically play and need to get a point across in 6 seconds; entire articles are boiled down to just a headline because they'll be scrolled by; tweets and memes show up everywhere (and sometimes, the memes are just screenshots of tweets—such is the media landscape). To get clicks, adjectives like "miracle," "radical," and "disastrous" are used to present research without context.

In short, scientists communicate their science prolifically and the world consumes it rapidly. However, there seems to be a gap between the two parties—communicating science *well* so it is understood. This communication gap is easy to see in many current public debates involving the climate crisis, vaccination, transgender individuals' existence, among others. The public notion of uncertainty is much different than the many definitions of scientific uncertainty. It might seem like mere semantics to some, but these public scientific debates have real life-and-death consequences for people.

A scientific discovery is only as good as its communication; the key is to accommodate the multiple communication paths from that discovery. Scientists doing the work can see more connections themselves when they organize data in a different way. Colleagues will more easily replicate experiments. Technical writers would have more context when writing up the research. Reviewers can see more of the scientists' thought processes and paths during the peer-review process. Editors will better understand the papers' fit for the industry and publications. Journalists will present the

✉ Gee Abraham
Gee@geeabrahamedits.com

[1] Lakewood, CA, USA

research more accurately and provide a broader base. Readers—those thousands of readers that can be *reached*—will more easily comprehend, contextualize, and then build upon and spread the science.

After a few years of involvement with journals, I saw a clear trend of great science communicated just well enough to get published, but not well enough to provide much other context. Often the most critical finding in a paper was hidden within a wall of text, when it could be summarized much more clearly in a table or diagram.

I reviewed one paper recently that went against the trend, and I mention it to anyone that will listen. It has not been published yet as of this writing, but the specifics are not important. The highlight for me was that it included two rarely-seen sections: a Graphical Abstract and a Prime Novelty Statement. The Graphical Abstract section complemented their traditional abstract by including key figures and data in a flowchart illustrating the experimental process. The Prime Novelty Statement summarized the reasons why that research was new and needed, in simple terms and in only a few lines. My hope is for sections like these (and more) to be added to every scientific paper, since they are helpful for all parties involved. These sections can be included in addition to the traditional technical sections, in a nod of understanding to readers who learn better with visuals or need a little more context.

In this very journal, in the first editorial of the first issue, the reason for communicating science is laid out explicitly: "The objective of a technical journal in any field is to foster the dissemination of acquired knowledge to a broader audience, so that other researchers may use and build upon the work of their colleagues" (Deacon, MMA 1:1–2, [1]). This can be achieved only if the broader audience *understands* the science that is communicated. And *that* can be achieved only if the science is communicated clearly, efficiently, and contextually.

Science communication needs to be more than just the technical details, more than appendices full of raw data, and even more than a gallery of pretty pictures. I love microstructures as much as anyone in this industry, but I love their explanations and context better.

Reference

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