Accurate science or accessible science in the media – why not both?

June 2 2016, by Joshua Conrad Jackson, Ian Mahar, Jaan Altosaar And Michael Gaultois

Credit: AI-generated image (disclaimer)

Every day, millions of people take to search engines with common concerns, such as "How can I lose weight?" or "How can I be productive?" In return, they find articles that offer simple advice and quick solutions, supposedly based on what "studies have shown."

A closer look at these articles, however, reveals a troubling absence of scientific rigor. Few bother to cite research or discuss studies' methodologies or limitations. The authors seldom have scientific training .

As young scientists from four diverse fields (psychology, chemistry, physics and neuroscience), we've noticed that much writing about science, particularly on topics most relevant to the daily lives of readers, is currently failing to resolve the trade-off between accessibility and accountability. Rigorous findings shared by researchers in specialist journals are obscured behind jargon and paywalls, while accessible science shared on the internet is untrustworthy, unregulated and often click-bait.

If this communication crisis is due to a lack of scientifically literate voices, the solution may be for more scientists to enter the fray. Scientists have the expertise to publicly correct misinterpretations of their and others' data. By developing new ways to disseminate science knowledge, they can help prevent inaccurate and overhyped stories from gaining traction. We argue that scientists bear a responsibility to reform the way their work is ultimately communicated.

Science gets lost in translation

Scientific publication – which operates through an intensive peer review process – is flourishing. In 2014, over 2.5 million scholarly articles were published on topics that ranged from how to reduce carbon emissions to how Twitter influences the rate of heart disease and how regular exercise can prevent inflammation associated with rheumatic diseases. Because of recent research, we know there's little evidence that genetically modified vegetables are unhealthy, and that eating less meat is a simple way to positively influence the environment.

These are important messages, and when people don't hear or listen to them, there can be serious consequences. Misinformed campaigns arise against vaccinations, and near-extinct diseases return. Mental illness remains shamefully stigmatized. Climate change is dismissed as fiction. People become erroneously convinced that red meat causes cancer and that eating dark chocolate helps weight loss.

Rigorous science is locked away

So how can we ensure that everyone has access to useful science knowledge?

Most scientific articles are aimed at an audience of other experts in highly specific fields, making them ill-suited for popular consumption. Between complex methodological language and frequent acronyms, even scientists have trouble following the jargon specific to other fields, leaving little hope for those with less scientific training.

An even more pressing issue, however, is that people outside of research institutions can't even access most journal articles. Many of these papers are hidden behind a publisher paywall, and nonsubscribers are forced to pay US$30-$50 for a single article.

These paywalls are not merely obstructive; we would argue they're also unethical. Most research is publicly funded, yet taxpayers are charged to consume scientific articles.

Ideally, scientific publishing will transition to healthy open-access journals that serve both researchers and readers. Legislation regarding quasi-monopolistic scientific publishing companies, predatory publishing practices and public access to primary scientific sources would go far to serve this end.

The European Union recently stipulated that all publicly funded research articles be freely accessible by 2020, but the United States has not yet passed a similar mandate. Scientists will play a crucial role in calling for and implementing these kinds of changes.

The public wants accessible science

As debates over open access continue, people's desire and need for evidence-based solutions to medical and social dilemmas has not diminished. As a consequence, we see a rising tide of popular science outlets that are more accessible both in content and availability than the research journals some of their content is ostensibly based on.

These platforms range in accuracy, from questionable blogs preaching "7 ways to get happy now" to serious websites and magazines like Discover and American Scientist. As part of our own efforts to bridge the divide between accessibility and accuracy, we each contribute content to the nonprofit Useful Science, which curates research for the general public through short reviewed summaries and an in-depth podcast.

However, even reputable sources are not immune to sensational headlines. In 2012, an article in ScienceNews on female mimicry in snakes was titled "She-male garter snakes: some like it hot." An article on male sheep neuroendocrinology was headlined "Brokeback mutton" by the Washington Post, and "Yep, they're gay" by Time. This unfortunate trend in popular science suggests that open-access publishing, even if it does proliferate, would still need to compete with flashier posts that sacrifice strict validity for clicks.

The growth of science communication websites that solicit and address questions and feedback directly and immediately from the general public provides some hope. These include Quora and communities on Reddit such as AskScience. The popularity of these resources (AskScience has

over eight million subscribers) shows that a good portion of the public wants scientific information communicated, on demand, in an accurate and approachable manner. Furthermore, a lack of direct incentive for contributors may make content manipulation less likely.

These efforts are laudable but suffer from a lack of accountability – any author can claim to be speaking from a perspective of expertise. Even in the best cases, when authors have training in science or its communication, advice is not scrutinized prior to posting.

There are ways to resolve these problems. Science journalists should solicit feedback from independent experts before publishing. Posts in scientific communities could go through an expedited peer-review process. In all cases, scientists and science communicators should be working together to match the accessibility of their content with accuracy and precision.

Who will lead the revolution?

The present state of science communication reveals important work to be done, but no burden of responsibility.

Some responsibility seems to fall on scientific journals, but most journals are profit vehicles, not conscientious individuals. Some seems to fall on media outlets, but many websites and magazines are squeezed by intense competition for ad revenue. Furthermore, reporters are seldom trained to understand science, let alone contribute to the discipline's evolution.

The onus, then, is on scientists. There are 20 million people with science or engineering degrees in the United States alone. Instead of passively consuming media with outrageous scientific claims, it should be scientists' personal responsibility to make research freely available, and

to moderate accessible scientific communities so they're accurate and accountable. Scientists should also work with journalists to set guidelines for media publication, such as a vetting process where popular articles are approved by experts in the field before publication, and should speak up when inaccurate information is disseminated.

It's time for the scientific community to act; not only as individuals, but also as interdisciplinary groups. If scientists do so, the next generation of science communication vehicles may be coalitions of journalists and researchers (as in The Conversation's collaborative model) who can disseminate messages that are both exciting and responsible. Science will not only be more interesting and accountable. It will also be more useful.

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