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COMMENT

Negotiating Science-in-the-Wild

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ABSTRACT

In this response to Tolbert's 2025 commentary, "Trust, Distrust, and the 'Competent Outsider': Rethinking Science Education's Responsibilities in the (Dis)Information Crisis," we address the nature of disinformation in the untamed landscape of public media, what we call "science-in-the-wild." We contrast political perspectives about how to situate science in society with the epistemic need to share specialized knowledge in society and the corresponding educational role of science media literacy in discerning who speaks for the expert scientific consensus. Notably, we distinguish interpersonal trust (based on individual judgments about power and benevolence) with epistemic trust (based on principles of conveying reliable knowledge).

> *People like to say that the coTEnflict is between good and evil. The real conflict is between truth and lies.*
>
> Don Miguel Ruiz

1 | Introduction

In a recent commentary, Tolbert (2025) vigorously advocates for a Vision III-type science education (e.g., Gandolfi 2025; Kruse et al. 2025; Sjöström 2024): promoting social justice, providing critiques of commercialized and politicized science, making scientific funding and intellectual labor more democratic (e.g., Kitcher 2001, 2011), and fostering personal scientific agency. The occasion for (and target of) Tolbert's critique, however, is the recent report, *Science Education in an Age of Misinformation* (Osborne et al. 2022). Her implicit claim is that to resolve the scientific mis- and disinformation crisis, we must first foster trust by democratizing science. We disagree. In our response, we describe two critical weaknesses in Tolbert's analysis. First, we distinguish science versus science *as reported in the media* (what we call "science-in-the-wild") and identify the problem of misinformation as primarily about trust in the later. Second, we highlight the distributed nature of specialized knowledge in modern society and reaffirm the inescapable role of expertise in assessing the epistemic merit of scientific claims.

2 | Science-In-The-Wild, Not Science Itself

First, *disinformation is not about a failure of trust*. Why not? D—Because the purveyors of disinformation are largely not scientists. Rather, they are imitators: *pretending* to represent science. They strive to persuade and mislead consumers and citizens with *faux* science. It *looks like* science but embodies none of the epistemic work that might justify its claims. As described by sociologist Christopher Toumey, they "conjure" an *illusion* of science with "cheap symbols and ersatz images" (Toumey 1996, 6), whether about the cause of AIDS or the imagined dangers of GMO foods. Reorganizing science as Tolbert suggests will not eliminate these adverse influencers, *because they lie beyond the boundaries of science*.

The core problem, we contend, is not distrust, but the actions of special interests who seek to hijack the (trusted) voice of science *in the media*, where they can mislead consumers and citizens. They sometimes refer to their claims as "alternative" facts,

suggesting that some kind of genuine choice exists (Allchin 2018). By using the internet and social media, they endeavor to bypass the conventional gatekeepers of the news media and responsible journalism (Höttecke and Allchin 2020). They use various persuasive and manipulative tactics based on social psychology (Allchin 2012a). They aim to dodge real experts (who might otherwise be trusted)—or they dismiss them as irrelevant. This is *science-in-the-wild* (Figure 1): a political landscape beyond the epistemic principles that govern the work of the scientific community. Misinformation about science is not about poor science communication or some purported "post-truth" world. Rather, it is about those who seek to *displace* authentic science with claims that masquerade as science. That is, misinformation is not a problem of science per se but of pretensions to science *in the media* (Allchin 2022b; Höttecke and Allchin 2020). Accordingly, bolstering trust in (authentic) scientists *will not solve the vexing and vicious problem of disinformation*, because the information *comes mainly from non-scientific sources*.

The chief challenge posed by *misinformation* is thus not that consumers *dis*trust authentic science (Figure 1, left). Rather, they too readily trust disinformants—what Oreskes has aptly called "facsimile science" (Oreskes 2019, 240) (Figure 1, right). As research has shown, naive media consumers are vulnerable to various deceptive and persuasive maneuvers (e.g., Breakstone et al. 2021; Caulfield and Wineburg 2024; Kozyreva et al. 2024; van der Linden 2023). Students and others are susceptible to cherry-picked evidence, plausible-but-misleading arguments, incomplete theorizing, and ungrounded skepticism, as well as fearmongering and conspiracy theories (e.g., Osborne 2024; classroom activities: Allchin 2024a, 2024b). They are often swayed by non-epistemic factors, such as identity, partisanship, peer pressure, confidence, false consensus, prestige, fear and other emotions—all well-known to advertisers and public relations firms, who are widely enlisted to shape public opinion and consumer behavior (Allchin 2012a; Bloomfield et al. 1996; Jiménez and Mesoudi 2019; Kendal et al. 2018; Muthukrishna et al. 2016; Zarnoth and Sniezek 1997; Zou and Xu 2021).

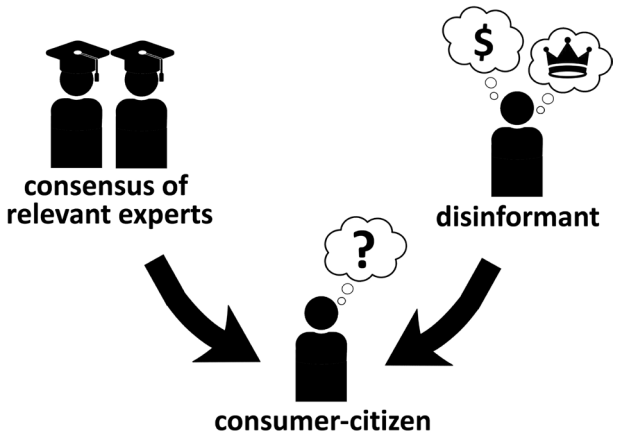

FIGURE 1 | Science-in-the-wild. In an unregulated media environment, the consumer of science faces a dilemma: Who speaks for science? Is it the consensus of the relevant experts (based on critical discourse in an appropriately diverse community) (left)? Or is it anyone who can persuade you to trust them (even by non-epistemic means) or heed their messaging (right)? How does the consumer-citizen determine which is fact, which is faux?

Thus, many are deceived by bogus claims that the MMR vaccine causes autism. Or that hydroxychloroquine or ivermectin can effectively prevent or treat COVID. They believe in a flat Earth. Rogue sources of information tell them falsely that vitamins will cure AIDS (Goldacre 2010); that fluoridation poisons the public water supply (Toumey 1996; Martin 1991); that luxuriant lawns and grassy athletic fields are eco-friendly (Allchin 2023); and so on. These are not the claims of authentic science. And what are the concrete consequences of heeding bogus science? During the covid pandemic, anti-vaccination sentiment in the U.S., buoyed mostly by misinformation and epistemic hubris, contributed significantly to an estimated quarter-million deaths (Gisondi et al. 2022; Jia et al. 2023).

Increasing trust in science is no remedy if the purported "science" that you trust is not truly science. The chief problem is not a "crisis of trust" in science (Tolbert, p. 4), but whether confused consumer-citizens can effectively discern *who speaks for science* in public media (Allchin 2022b). This competence forms the core of Science Media Literacy, or SML (Allchin 2022a).

For those who are concerned about the welfare of marginalized or disenfranchised groups in our society and endorse Vision III, SML should be a major concern. For it is just these populations who are disproportionately affected by the deceitful practices (e.g., Barlow 2024; Bhattacharya et al. 2024; Krings 2020; Nemer 2025). Disinformation is about power. The epistemic authority of science is earned by its methods of evidence and peer review (not by some social process of building interpersonal trust). Yet good science can threaten the profit, prestige, or privilege of certain private interests. Thus, the fossil fuel industry has sought to promote false claims discounting the role of carbon dioxide in global warming and climate change, *while calling it science* in the media (Allchin 2015; Oreskes and Conway 2010; Mooney 2005). The National Football League appealed to sponsored research publications (not suitably peer-reviewed) that tried to obscure the science on brain trauma from concussions on the playing field (Fainaru-Wada and Fainaru 2013; see also Belson 2026). Chemical companies hired consultants to deny that their flame retardants were toxic (Kenner 2015). In 2014–2015 democratically elected leaders failed to heed scientists' recommendations about managing the tainted water supply in Flint, Michigan (Tolbert, p. 2) and sought to escape responsibility through outright lies (Flint Water Advisory Task Force 2016). But these cases are not about science. They are about special interests trying to appropriate the authority of science through disinformation (McGarity and Wagner 2008; Michaels 2008, 2020; Union of Concerned Scientists 2019; classroom activities: Allchin 2025b, 2026).

Exposing the falsities of misinformation from would-be scientists is one important way of reclaiming power for the people. Not by dramatically changing how science is done (or what science, or by whom), but simply by helping consumers assess their sources of scientific information and any media appeals to science. SML is thus a potent tool for social justice. It aims to disable the rhetoric from commercial and political interests who would seek to undermine the legitimacy of science about occupational health, say, the causes of gun violence, or environmentally harmful products (Allchin 2018, 2021). This is where many of the critical postures that Tolbert recommends (pp.

3–4) can prove fruitful, in discerning when a *reported* scientific claim reflects a well-formed critical consensus or when it may be biased by conflict of interest (McGarity and Wagner 2008; Michaels 2020; Oreskes 2019; Oreskes and Conway 2010). SML is key to holding *claimants* "accountable and responsible to their communities" (Tolbert, p. 5). For example, historically, such analysis would have helped validate Rachel Carson in her 1963 work *Silent Spring*, describing the environmental dangers of pesticides, amidst attacks by the chemical industry (classroom activity: Allchin 2025b). Or it would have helped defend the science of Alice Hamilton in her quest to safeguard worker health and safety, especially around lead poisoning, in the face of powerful industries (classroom activity: Klein 2012). Combating disinformation through science media literacy is thus a way to empower marginalized groups in a democracy or capitalist economy, and to promote social justice (through "information justice," if you will). That is, SML's primary goal is to ensure that well-justified scientific claims are, indeed, recognized for what they are, and can thereby effectively inform personal and public decision-making (National Research Council 2012; Rudolph 2024).

3 | Sociopolitical Versus Epistemic Forms of "Trust"

Our primary contention with Tolbert's commentary is that in attending to the sociopolitical context of science, we should not thereby disregard its epistemic dimension. We advocate distinguishing fact from faux, not friend from foe.

Yes, "trust"—in the form of understanding the sociocultural context of science as one form of expertise among many others—is essential. All educators seem to agree on that now. Still, detailing the *sociopolitical* context of science does not address the fundamental *epistemic* problems central to identifying reliable science, on the one hand, and neutralizing misinformation, on the other (e.g., the two branches in Figure 1).

Ironically, perhaps, disinformation can emerge only because (contrary to Tolbert's assertion that there is a "crisis of trust" in science; p. 3) there is already widespread public trust in scientists (still higher than most other professions, despite a recent retreat in confidence; e.g., Cologna et al. 2025; Ipsos 2022, 39–43). This high level of trust entices nefarious actors who see opportunity to claim that authority for themselves, without engaging in any research or scientific work (Allchin 2012a; Lupia et al. 2024, 214). If there were no trust in science, there would be no effort to imitate it. For example, Robert F. Kennedy, Jr. and Judy Mikovitz, in their screeds against vaccination, cite scientific studies and believe (alas) that the authority of science is "on their side." Many consumers "trust" those anti-vax voices based on non-epistemic factors. However, it does indeed matter that these voices are not experts, cannot address the biases or sources of error in their claims, and are out-of-step with the consensus of the relevant experts. Like others noted above, their "science" is *bogus* science, akin to the educator's conventional category of pseudoscience (Hansson 2017). It is all mimicry. We must help students not confuse such efforts with real science. That is the aim of science media literacy.

The recent report *Science Education in an Age of Misinformation* (Osborne et al. 2022) conceptualized "trust" in a different, more modest way: not as trust in scientists or a group of elite "insiders" (Tolbert, pp. 3–4), but specifically as trust in *particular claims* reported in public media (Note that polling agents now recognize several distinct forms of trust: in scientists vs. scientific institutions vs. scientific methods vs. scientific claims; e.g., Achterberg et al. (2017), Lalumera (2024), Lupia et al. (2024)). "Trust," in this case, is based on epistemic justification—not the amorphous amalgam of personal judgments about competence, honesty and benevolence involved in interpersonal or "ordinary" trust (e.g., Anderson 2011; Hendriks et al. 2015; classroom activity: Allchin 2025a).

The key challenge for the consumer-citizen is distinguishing authentic science from its imitators (Allchin 2022b). SML focuses on how one can make this distinction *without* being an expert oneself. John Hardwig (1985, 1991), Stephen Norris (1995), and Bromme and Goldman (2014), among others, have underscored that there is no escape from the conundrum of modern society: in a culture of distributed specialized knowledge, we all depend on others who know more than we do. And this applies not just to scientists, but also to dentists, auto mechanics, X-ray technicians, bridge-welders and food inspectors, not normally viewed as "elites." We interact with these experts, but we generally respect their specialized knowledge, rather than imagine that we can (or should) "co-produce" their knowledge (Tolbert, pp. 1, 4, 5). That is the very nature of expertise. Alas, the romanticized educational ideal of complete intellectual independence is past (as vividly articulated by Norris 1997). So, too, is the era of interpersonal one-on-one trust and personal accountability. Cooperation and trust must function in large complex networks of indirect reciprocity (Allchin 2009). The internet, the multiple layers of social media re-postings, and the information meat-grinder known as AI have generated a new era of information flow, mired in problems of credibility, expertise, provenance, and transparency. Our mutual interdependence invites reflection: how do we achieve an effective system of *epistemic trust*—outside the familiar norms of interpersonal trust—that allows society to function? (Allchin 2012b, 2022b; Goldman 1999).

Further, informed epistemic trust must function in a media environment where those threatened by good science seek to erode the legitimacy of science altogether. They try to peripheralize the very nature of trust in knowledge, expertise, and the fruits of systematic investigation (e.g., Nichols 2018). They try to discredit the importance of relying on empirical evidence, the methods of science, and/or the value of robust analysis across multiple perspectives. They attack the very notion of experts or depict them as inherently "compromised" or "corrupt" (Tolbert, pp. 3–5). They question every possible source of error, regardless of whether the criticism is truly justified. The aptly dubbed "merchants of doubt" are everywhere (Kenner 2015; Michaels 2008, 2020; Oreskes and Conway 2010).

Blind, untethered skepticism is cheap. It is easy to impeach any science or malign any scientist. There need be no evidence, or justified alternative, to undermine trust. Unsubstantiated doubt is, psychologically, incredibly corrosive. This is why corporations, policy makers and political leaders—not the professional scientists—attempt to "actively shape what counts as knowledge

and practice within their fields" (Tolbert, p. 4). They try to discount the inconvenient truths of science. But only scientists themselves have the expertise to debunk their bogus science. Witness the IPCC scientists who called out the politicians' who edited their report (acknowledged by Tolbert in her footnote 4) or the more than 85 scientists who reported the egregious misrepresentations of scientific consensus in 2025 by the U.S. Department of Energy's hand-picked Climate Working Group (Union of Concerned Scientists 2026).

Science in society involves two levels of epistemic work. The first is the generation of reliable knowledge (within science), based on mutual accountability in an expert community. The second is transferring that knowledge faithfully to others (in the media). The familiar principles of the former must now be creatively adapted to the latter. We must now teach about the epistemics of science-in-the-wild. If students, citizens, and consumers are not to be fooled by self-proclaimed experts and science con artists, they need to understand the social architecture that governs not only how scientific knowledge is vetted within the scientific community but also how it is faithfully communicated to others (Allchin 2012b; Goldman 1999). Developing the competences that guide *informed epistemic trust* for the non-expert (Allchin 2022a; Osborne and Allchin 2025) is central to the conventional science educational goal of preparing consumers and citizens (National Research Council 2012; Rudolph 2024). Teaching science media literacy is, therefore, essential for non-scientists and even for scientists outside their primary field.

Tolbert's argument contrasts a sociopolitical view of "science for the people" against the epistemic view of "science by the experts" (p. 4). In our view, this is a false dichotomy. It pits politics and epistemics against each other in an unwarranted zero-sum, either-or game. Accordingly for her, disenfranchised consumers and intellectual elites need only "negotiate" a solution *politically*: clarifying their respective roles and domains of authority, all pivoting on the role of *interpersonal* trust. In that view, scientific expertise and media fidelity are secondary. In our view, however, the core problem is inescapably *epistemic*. Individuals (who cannot be expert in all things) must "negotiate" a pathway through a minefield of misinformation to reach the reliable expert knowledge that can inform them in personal and public decision-making (Figure 1). That process inevitably hinges on understanding the indicators of reliable scientific knowledge and how the media work—the elements of *epistemic* trust (as presented earlier in Osborne et al. 2022). Again: fact or faux, not friend or foe. One approach ought not eclipse the other.

Data Availability Statement

The authors have nothing to report.

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