

Journalism Education special edition: science journalism in education and practice

Esoteric plaint of scientific authority and scientific uncertainties makes science journalism education and practice a redoubled challenge

Journalism Education is pleased to introduce this edition's guest editors, Prof Gita Bamezai, Former Professor and Head Department of Communication Research Indian Institute of Mass Communication New Delhi and Coordinator of the First-Ever Critical Appraisal Skills programme on Health Journalism and Communication in IIMC in collaboration with Reuters Foundation, UNICEF, and Oxford University; and Communicating Science for Media Professionals under the United Nation's Capacity Building programme for Communicating Bio-safety Programme in India

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For a long time, the public's main source of information about science and technology has been the mass media. Current scientific and technological developments are becoming dominant elements of everyday politics.

Science informs public policy as well as personal decisions on environment, conservation, agriculture, health, transportation, communication and defence. Almost every aspect of modern life is impacted by scientific knowledge. Contemporary world is largely governed and run by science and scientific innovations and is shaping our social, legal and political landscapes in which we live and act. If, on one hand, technology is gaining wider social acceptance, on the other, apprehensions are voiced of potential risks associated with some of the novel techno-scientific innovations. Scientific and technological controversies are creeping into our public discourses.

The Covid-19 pandemic has also thrown up challenges for all of us, where we not only need to re-evaluate our current science journalism approaches but also innovate new ones. The pandemic has created a niche area of communication where scientific research, health, environment and risk communication intersect and interact with each other. At this juncture, need for science journalism is now more than it has been ever before. Science Journalism has the potential to engage the public on broader scientific and technological discourses and in strengthening our democratic and liberal values.

With increasing corporate control on scientific research, profit is slowly replacing the idea of larger public good in science. Contemporary scientific and technological developments such as Artificial Intelligence, CRISPR and self-driving vehicles are generating important ethical and social questions. The present-day scientific developments have the potential to change the course of human history and evolution. Artificial Intelligence technologies would have far reaching effects on our work force, transport, business, employment, transport, healthcare and basically on every aspect of human life. Similarly, Human Genome Editing technique would have even deeper impact on our life itself.

Not only is Technology redefining and reshaping the ideas of democracy and citizenship, but the current scientific developments are themselves now strong ingredients of both political communication and everyday politics. Emerging political cultures are altering the way we think about aspects of expertise and trust in policymaking. In such a scenario, science and scientific innovations not only need to be celebrated but also watched with a sense of scepticism. Critical science journalism could focus on providing a balanced assessment of the work, one that highlights specific strengths but also emphasises specific limitations or flaws. We believe that science journalism must understand the widest social and cultural consequences which scientific and technological innovations have or are capable of having in the society. At a juncture when lot of politics happens around scientific knowledge in terms of claims and counterclaims, science faces challenges at multiple fronts. Science journalism can enrich the public's understanding of science and also prevent misleading claims from going viral.

With ever evolving digital technologies, mobile devices and social media platforms, the entire media landscape is changing and so is science journalism. New media platforms are broadening access to scientific information. But with the increasing access to scientific information, there is also a tremendous regional deficit which is felt in academic and training programmes in the field of science journalism.

A vibrant science journalism would not only act as a watch-dog but would also ensure that such technological innovations are used for global development and human welfare which makes it incumbent to ensure that these operate within our ethical and moral limits. Our embrace of novel technological pathways, as Sheilla Jasanoff puts it, 'leads to a complex interplay of technology, ethics and human rights'. (Jasanoff, 2016). Hence, to explore the ethical aspects of a technological driven society should be our foremost duty.

Science journalism plays a considerable role in democratizing the institution of Science. Science journalists strive to help democratize science by not only simplifying it (Allan, 2011) but also bringing it into public sphere.

There is still a disconnect between science and the public. The disconnect is partly due to what critical theorist Habermas observed as large-scale specialization of scientific research and also increasing bureaucratization of the institution of science (Habermas, 1971). Public participation in scientific research can bridge this disconnect.

Such discourses are still limited to academia and have not captured the attention of science journalists. Scientific literacy (which includes literacy with regard to science, health and environment), in society is now more needed than ever. This can be achieved by what Global Science Report calls ethos of science journalism which include informing, translating complex material and educating the masses. (Global Science Journalism Report, 2021) Besides, our public policy is becoming more and more dependent on scientific knowledge and technological interventions. Science is becoming an inalienable part of our daily lives, at a pace, seen never before in the history of mankind. Journalism has a vital role to play in ensuring that the scientific knowledge is used for human welfare while keeping a watch on the latest developments in the world of science and technology, and concomitantly raise questions of how and in what ways they are going to impact our lives.

Mass media discourses on scientific and technological developments could ensure that they follow our ethical and moral values while also taking into consideration environmental sustainability. Credible science journalism would also help inform science about societal needs, and thus contribute towards its public welfare goal. In the wake of scientific & technological developments, which have far-reaching consequences, it is now becoming absolutely necessary that we have a proactive science journalism ecosystem in the world.

The spread of Covid-19 pandemic brought with it risks and vulnerabilities unknown to many of us. It became another instance when we felt an incredible need for a vibrant and quality science journalism. The problem of misinformation and disinformation has been rife and in tandem with the phenomenal rise of 'infodemic' which has made it incumbent to establish quality science journalism practice at the local and regional level as well as national. Pandemic is a tangible proof of how unmindful and wilful human interference of nature can have catastrophic results. Covid-19 pandemic gave rise to an urgent and inevitable need to **push the boundaries** of science journalism, beyond and envisioning a holistic approach involving environment, health and science taken together in reporting an issue. It also nudged us about how as humans we need to govern and manage our scientific research efficiently. Healthcare became a prime focus in every country in the past one and half years and we slowly realized that we will never affect a truly meaningful health care reform if we don't improve the public dialogue about it. A meaningful science journalism can play a considerable role in facilitating such a healthy public dialogue. Covid-19 pandemic also reminded us of the inevitability of an effective health risk communication strategy. In fact, the consequences of any influenza pandemic for a vulnerable population depend partly on the effectiveness of health risk communication. (Vaughan and Tinker, 2009)

Year 2021 also saw the release of Global Science Journalism Report, which put a spotlight on the present and future of science journalism. While majority of the respondents who were surveyed as part of the report on one-hand, believe that science journalism was becoming more interesting in line with scientific advances but on the other agree that too few people are reporting on the process of science as opposed to reporting on the results of scientific research. Contrary to the common perception, majority of science journalists who were surveyed are happy with their jobs, the vast majority of them see themselves staying in their occupations for the foreseeable future also. The respondents see science journalism performing multiple roles which include promoting science literacy, exposing complexity, motivating change, rebuilding trust in science, verifying information, making science the key element of public debate and engaging the public on scientific issues. The report also found that like science, science journalism is also acquiring a global character (p. 22). Science and Technology is progressing at a very fast pace. New technologies are emerging almost on a daily basis. Some technologies, ome, are laden with risks and public needs to have a keen eye on such developments. In such a scenario, science journalism matters more than ever. It acts as an interface between science and society. (Machado, Rumjanek and Jurberg) science journalism through promise and potential of covering scientific research, has great potential to promote a deeper understanding, engagement and public participation in Scientific enterprise. Our media educational departments and institutes are yet to fully realize the full potential of this discipline both in terms of theoretical understanding as well as journalistic practice. The gap is glaring especially in developing and underdeveloped world, where we still are lagging than developed world, in terms of quality science journalism courses and fully trained science journalists. The need is to bridge this gap by mainstreaming science journalism education in media education institutes and also devising innovative curriculum for the media students.

In this special edition of the Journal we bring several such papers which explore the ways the science journalism can be made an integrative aspect of the journalism education and training. In his paper, **Threshold Concepts in Science Journalism**, Richard Evans provides a critical assessment and analysis of Journalism courses which have by and large skirted teaching and enhancing skills of students in science. He advocates for a more broader approach to science communication since the training is pivoted on teaching logical and reasoning approach as journalistic norms. In the post-truth era where conspiracy theories and misinformation abound on social media, informed and accurate reporting has never been more important than today. The dilemma of retaining the traditional stance of keeping reporting close to the surface does conflict with the skills and knowledge which science journalist is expected to have and some of which are counterintuitive to the traditional practices of the news journalist. However, these are transformative traits since they enable students to have a altogether different world view.

Evans explains that science journalism is more than just reporting science related news since it entails 'seven threshold concepts which are pivoted on scientific enquiry and acquisition of scientific analytical tools as the standard practice. Such conceptual familiarisation with scientific procedure would provide impetus to not just doing science journalism but allow dividends for the entire spectrum of journalism teaching and practice. The concept of news has primarily been underpinned by the art of telling stories of quirkiness, of drama, conflict and scare. Some of these elements find an echo in the way pandemic stories have been done in the media. Without fundamental understanding of science by the media, likelihood of distortion and twisting of scientific information results in circulation of false information which can have serious consequences as politicians have a penchant for media scientific stories in making policy decisions. Evans warns of the trend to claim coverage of scientific news whereas science requires critical faculties to

distinguish between serious scientific research and sensationalism or infotainment. The nature of science is different from epoch making sudden discoveries, since science is an iteration process, building on the past work and making it work better. 'Resistance to changing learning and knowledge skills make journalism education poorer since journalists tend to see themselves as literary intellectuals than scientists with well-informed understanding of data science'.

Uncertainties of science are inherent to the process of scientific results as it is termed as 'prediction uncertainty'. Inclusion of scientific process and procedure in the general journalism curriculum, either as part of a dedicated session on reporting science, health, technology and the environment or through more general discussion about news and current affairs would be a good beginning. In his paper **COVID19 pandemic, Uncertainties, and the challenges of science communications**, T.V. Venkateswaran takes a step forward in highlighting that three hoary practices of objectivity, fairness and balance in journalism generally fail to uphold scientific knowledge and can impede the process of news making in significant ways. The uncertainties in scientific discovery if seen from the journalistic frame can distort and lead to misinformation since paternalistic strategy eschews all uncertainties and presents science as an authority. Our vulnerability in placing faith in information that appears certain and fixed has had implications for presentation of news based on authoritative sources than evidence-based. This epistemic dilemma may have consequences for framing of news relating to sciences where knowledge seeking requires constant experimentation and incremental shifts in claims and counterclaims of ontological phenomenon.

The paper covers a wide spectrum of how uncertainties are viewed by the media and have a direct bearing on public debate about scientific discoveries, especially in the areas of climate change and health. The author examines how the deluge of mis and disinformation has led to a new trend of post-facto check of the published news as part of the post-truth era of scrutinizing media, especially social media as sources of news.

The author uses the example of pandemic and in the atmosphere of uncertainty, preceded by uncertainty and the speed at which the virus spread, the issues of balance and fairness portends nothing short of harm. Herein, three exemplars of media unwittingly spreading mis/disinformation while facing 'uncertainties' in science are presented. These messages were 'balanced' but could not be classified as 'fake news', but the journalistic practice of balance and fact check clearly was inadequate in presenting what constitutes evidence and fact.

He argues that the actual practice of fact checks, both ex-ante and post-ante are inadequate to deal with such disinformation arising out of uncertainties of the nature of science. Presented as incommensurable conflicting claims, the journalistic presentation polarises what essentially is an ambiguity in the face of 'unknown unknowns' as well as limited and evolving shreds of evidence available at hand. In this emergent "knowledge-based journalism" (Patterson,2013), environmental journalists have cast aside the traditional notions of balance and replaced them with newer notions of objectivity. By implementing a transparent method, these environmental journalist have pursued a new path that avoided 'false balance' and outright advocacy (Fahy, 2018). To mitigate the ills of false balance (Revkin, 2014), instead of looking for the extreme ends of a spectrum of opinion, such areas are needed where scientists are in 'deep consensus' than in conflict and controversy.

In presenting solutions to the problem of heightened crisis especially in coverage of climate change, Nicola Baird in the article, **Students and the climate crisis** presents the challenge teachers face in the classroom while helping students to sift through terrifying stories about climate breakdown making to the front pages.

The premise of holding attention of the readers in the contesting media landscape for attention and revenue, controversy and uncertainty in science journalism have become the primary vehicles. Consequences of such frenzy reporting of scientific claims may have unexpected consequences in terms of distress and ambiguity among the readers about the future. These are not benign reactions since these may lead to mental and depressive ideas about our abilities and mitigation efforts. Nicola directs her attention to practice and learning the skills of solution science journalism. Such education can help journalism students bring deep knowledge of climate change into their pieces without endangering their – or their readers' – wellbeing. The conventional news format that "if it bleeds it leads" works on skimming the surface but fail in critically analysing the shades of gray.

Research has even shown that solution stories about the environment motivate people to be more environmentally-friendly and it provides a new impetus to developing science journalism curriculum in an unconventional but innovative ways. From an academic perspective students of journalism are better introduced to neo-liberalism, environmental justice, the links between colonisation and the carbon economy and gain some thinking space about newer ideas such as the circular economy. Nicola describes this shift from a pure

watchdog role to a guide dog and affirms solution-based science journalism as the way for people to engage differently to news and heighten accountability of news media and the scientists.

In their paper **Development of Science Journalism in Bosnia and Herzegovina**, Anida Sokol and Ljiljana Đukanović cover a large spectrum of issues in science journalism which range from lack of interest of the journalists themselves and the readers 'interest in scientific issues' and where to look for scientific information.

Challenges of science journalism and communication may precede any efforts to address lack of interest of the readers or the ability of the journalists themselves not trained to understand the nuanced observations to define an obscurantist phenomenon. 'Journalists in the country lack skills and knowledge on how to find credible sources of science information and how to popularize scientific topics among the general audience.

The pandemic brought huge volumes of disinformation on an unprecedented scale – conspiracy theories about the origin of the virus and vaccines circulated on the internet and social networks. Sifting fact from misinformation becomes a struggle in absence of definite or confirmatory source to allay misgivings about the Covid-19 infection severity and mortality, and establishing a casual relationship between the two.

To reduce the scientific language to an easy way is a reductionist approach to make content readable but deprive the reader of an intelligent perspective since 'journalists use sources when covering such topics without questioning their credibility and common use of predatory journals and preprint works in journalistic content. The lack of quality, independent, analytical and well researched stories on climate change and protection of the environment contributes to the public's lack of information and interest.

The issue of false dichotomies or the persistent temptation to reduce complex problems to a "two-sided caricature", ranging from "mild" versus "severe" illness, saving Lives versus 'saving the economy'... A world of black and white is easier to handle for a journalist than one awash with grays. But false dichotomies are dangerous (Yong 2020) since such a stance is anathema to scientific culture and practice.

In the review article, **Understanding the art of science journalism: developed and developing country perspective**, Ashish Gosain, provides an expansive understanding of how boundaries and conditioning of science can no longer be seen from the prism of a specialised area of enquiry but as a socio-cultural right with inalienable implications for human survival and sustenance.

Emerging from the margins of the citizen or participatory science journalism, the indigenous systems of knowledge has remained consigned to ignominy and faced prejudice in absence of an epistemic approach. The article positions and underscores the inequities in the way science journalism or more appropriately science communication has remained entrenched in its dichotomous world-view based on Euro-centric scientific knowledge while undermining the claims of the developing countries'.

Underpinning 'how science is or could be more accessible and how scientific knowledge is made accountable', the democratic approach of science communication becomes central as an arbiter in disproportionate disease burden, vaccination development, environmental displacement, climate change controversy and racial inequities. The Tocquevillian ideal of participative democracy has multi-dimensional nature, which truly reflects the context of science communication. Despite emphasizing democratic ideals at the core of science communication, critical realism (sceptical and qualified realism) dictates taking an inward view of how the scientific community functions.

Media is no longer just a purveyor of scientific development but frames scientific innovations and uncertainties by weighing in its value on ethical dimensions than ethnocentric political stance or corporate profiteering. More than ever in the past, singular role of mass media in science communication has never been spoken of with both scepticism and with fervour in dealing with many sensitive but conflicting issues such as of climate change and Covid-19.

Major changes in the mass media technology have had far reaching impact on the way journalism is done, how people/viewers are dealing with the proliferation of news content, use of diverse sources and formats which impel us to analyse the context of the science journalism. In the changing context of a dominant techno-system where access to various delivery platforms is abundant, the flux caused by an increasingly digital, mobile, and social media environment, significant changes are occurring in the policy, regulatory and media market. These would have implications for (1) the public good of quality journalism, (2) competitive media market place, and (3) media and information literacy necessary to navigate the media environment effectively (Nielsen, et al, 2016). A surfeit of information channels and access routes invariably become compelling in unravelling more intrinsic issues in scientific enquiry and development. Science journalism teaching and training should be mandated as part of the mainstream journalism teaching since standards of logical reasoning, critical enquiry and interpretation of evidence are intrinsic to any area of journalism practice.

We need to seed the teaching curriculum with science journalism aspects by opening the area of enquiry into not just the procedure of appraising the scientific knowledge which would entail learning research, evaluating the scientific results and learning data interpretation. This perspective does not just provide an understanding of how scientific developments are shaping our world but how this complex system has to be evaluated in shaping the discourse of its iterative process than treating it as an established finality. Increased visibility through media coverage has increased public understanding of and engagement with scientific issues (Boykoff, M. 2008).which underscores the value of promoting science journalism and communication in different universities across the world.

Keeping in perspective, some of the issues spelled out here and with a zeal to broaden the discussion on science journalism education and practice, we are dedicating the special issue of Journalism Education to the theme, Science journalism in the world: education and practice.

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