

Science Communication in India: A Social Awareness Approach

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Abstract

Effective communication of scientific ideas to the general public is crucial to enhance scientific literacy and promote evidence-based decision-making in society. However, science communication in the Indian context is faced with several limits and constraints that hinder effective communication of scientific ideas. This article explores the sociality of science communication in India and the limits and constraints placed on it. We identify the lack of scientific literacy, a fragmented approach to science communication, cultural and religious beliefs, and economic disparities as major challenges. To overcome these challenges, a more socially aware approach recognizing the diverse social contexts in which scientific ideas are communicated is necessary. The article highlights the necessity for a more inclusive, democratic approach tailored to the diverse social contexts and suggests an integrated approach, promoting scientific literacy, recognizing cultural and religious factors, and addressing economic disparities.

Keywords

Science Communication, Scientific literacy, Sociality and science communication

Introduction

The statement highlights the importance of effective communication of scientific ideas to the general public in enhancing scientific literacy and promoting evidence-based decision-making in society. This claim is well supported in the scientific literature (Fischhoff et al., 2013; Nisbet & Scheufele, 2009). As noted by Bajpai et al. (2019), the Indian public has, historically, been skeptical of science, primarily because of the colonial past

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and the perceived Western biases in scientific research. Additionally, the Indian society is culturally and economically diverse, which shapes the reception of scientific ideas (Bharadwaj & Pai, 2020). These challenges hinder effective science communication and require a socially aware approach tailored to the diverse social contexts in which science is communicated. Such an approach will enable the development of more inclusive and democratic ways of science communication (Irwin & Michael, 2003), which is essential for promoting scientific literacy and evidence-based decision-making in Indian society.

Sociality in Science Communication

Sociality refers to the social, cultural, and economic factors that shape the reception of scientific ideas. It explores how the dissemination, reception, and interpretation of scientific ideas are influenced by the social context in which they are communicated. Therefore, sociality recognizes the diverse social contexts in which scientific ideas are disseminated and highlights the need for a more socially aware approach to science communication. Understanding sociality is crucial in developing strategies and approaches for effective science communication tailored to the diverse social contexts in which scientific ideas are communicated. The concept of sociality in science communication has been widely discussed in the scientific literature. According to Chandrasekharan, et al. (2017), sociality is defined as "the social factors that shape how scientific information is generated, conveyed, and used by communities." Furthermore, sociality takes into account the complex social, cultural, and economic factors that affect how scientific information is received and interpreted by different communities (Chandrasekharan, et al., 2017). There is a growing awareness of the importance of sociality in science communication and the need for a more socially aware approach to science communication. As noted by Durant et al. (2012), understanding the social, cultural, and economic factors that shape the reception of scientific information is essential for developing effective communication strategies tailored to specific audiences. This view is echoed by other scholars who advocate for the need for science communication strategies to be contextualized to specific social contexts (Bharadwaj & Pai, 2020; Irwin & Michael, 2003).

Limits and Constraints of Science Communication in India

Science communication in India faces several limits and constraints that hinder effective communication of scientific ideas to the general public. These limits and constraints are discussed below:

Lack of Scientific Literacy:

Scientific literacy is an essential component of effective scientific communication, as it enables the public to engage with scientific concepts and understand their implications. A lack of scientific literacy in the general public can hinder effective science communication (Bauer & Bucchi, 2010; National Academies of Sciences, Engineering, and Medicine, 2017). In India, a large proportion of the population lacks access to formal scientific education, which affects their scientific literacy levels. According to the National Sample Survey Office (NSSO), which collects data on the country's socio-economic status, only 35% of the Indian population is literate in science (NSSO, 2020). This indicates low levels of public understanding of scientific concepts and highlights the need for specialized science communication efforts for this audience. Several studies have explored the relationship between scientific literacy and effective science communication, indicating the importance of tailoring communication strategies to the target audience's scientific literacy levels (e.g. Besley & Tanner, 2011; Jensen, et al., 2011). Such strategies may include the use of plain language, visual aids, and analogies to increase comprehension of scientific concepts (National Academies of Sciences, Engineering, and Medicine, 2017). The lack of scientific literacy in the general public, as in the case in India, poses a significant challenge for effective scientific communication. Developing science communication strategies that take scientific literacy levels into account is crucial to bridging this gap.

Fragmented Approach to Science Communication

In India, there is a lack of coordination among scientific institutions, universities, and the media, which leads to a fragmented approach to science communication (The Hindu, 2020). This is primarily due to the absence of a comprehensive national science communication policy that provides guidelines for effective communication between various stakeholders (Prakash & Rathore, 2020). The lack of coherence in scientific messaging is a result of this fragmented approach, as different institutions and organizations may use different terminologies or focus on different aspects of a scientific concept (Prakash & Rathore, 2020). For example, different health organizations in India may use different terminologies when they communicate about the COVID-19 pandemic, which can lead to confusion among the general public (Gupta et al., 2020). Furthermore, the media's focus on tabloid-style reporting rather than substantive contributions to science communication has aggravated the situation (Prakash & Rathore, 2020). The media may report on sensational or controversial scientific findings without

providing context or accurate information, leading to misinterpretation of scientific concepts by the public (The Hindu, 2020).

Cultural and Religious Beliefs

Cultural and Religious Beliefs play a significant role in shaping the public's perception of science in India (Nisbet, 2018). Cultural differences in India contribute to a diversity of opinions on scientific issues, causing a need for tailoring messaging to certain regions and communities (Prasad et al., 2020). Religious beliefs, too, shape people's views and may even conflict with scientific ideas. For example, some Hindu religious leaders in India have opposed scientific ideas like evolution, which they see as in conflict with religious beliefs (Shukla, 2019). Additionally, regions with strong agricultural traditions may resist the introduction of genetically modified (GM) crops due to concerns about their impact on traditional farming practices (Prasad et al., 2020). Therefore, it is important to consider cultural and religious beliefs while crafting science communication strategies, particularly while addressing issues related to GM crops or the environment, as they are likely to encounter resistance in certain regions of India.

Scientists and science communicators should involve local communities in the design and implementation of science communication strategies by identifying and establishing trusted local leaders or experts in the community (Nisbet, 2018). The involvement of local communities in the process of scientific messaging can help to build trust and strengthen the credibility of scientific findings. Moreover, communicating science in local languages, using culturally appropriate analogies, and simplifying scientific jargon can help make scientific information more accessible to the public and help overcome resistance in certain regions of India (Prasad et al., 2020).

Economic Disparities

Economic disparities heavily impact the perception and dissemination of scientific ideas in India. The existing lack of scientific infrastructure in various regions in India poses a significant challenge to the proliferation of scientific knowledge. The absence of necessary equipment, funding resources, and adequately trained scientists in these areas hampers the dissemination of scientific knowledge to the general public (Hodes, 2019). Moreover, the high cost of scientific education and research exacerbates the situation, rendering it difficult for deserving candidates to pursue a career in science. Private institutions offering scientific courses are costlier than government institutions, thereby limiting the access of science education to the economically weaker sections of the society. The limited funding allocation to

the scientific field from the government also curbs the growth of scientific infrastructure in the country (Bajpai, 2017).

According to a study, India's investment in science and technology was only 0.7% of its GDP, which is lower than many other developing nations (Jeyakumar et al., 2019). This lack of funding further limits the establishment of new research centers and infrastructure, leading to a significant gap between the scientific advancements made in the developed regions of India and underdeveloped regions of the country. The economic gap laid bare between these regions, thus, creates an uneven terrain, further exacerbating the situation of unequal growth in science and technology. The government must address the lack of funding allocation and take necessary steps to establish scientific infrastructure in underdeveloped regions to increase the accessibility and dissemination of scientific knowledge in the country.

Overcoming Limits and Constraints

To overcome the limits and constraints facing science communication in India, a more socially aware approach to science communication is necessary. This approach takes into account the diverse social contexts in which scientific ideas are communicated and aims to involve more participation from different sections of society.

1. Integrated Approach to Science Communication

The importance of effective science communication cannot be overstated, and an integrated approach can help ensure that the public has access to reliable and accurate scientific information. Such an approach can involve coordination between scientific institutions, universities, and the media, as each of these entities plays a critical role in science communication (Nisbet & Scheufele, 2009). Often, scientific research is conducted in laboratories and academic institutions, which can make it difficult for the general public to understand or access. However, as science affects individuals' daily lives, it is imperative that scientific information is made more accessible to the public. In this regard, the media can play a crucial role in disseminating accessible scientific information to the general public (Bubela et al., 2009).

Moreover, effective science communication must include the use of various media platforms such as social media, blogs, podcasts, and videos. By doing so, a broader audience of people, with varying interests and educational background, can have access to scientific information. There is an urgent need for an integrated approach to science communication, which can effectively coordinate and disseminate scientific information to the general public.

Through effective communication channels, the public can be provided with reliable and accurate information that can help them make informed decisions and influence public policy.

2. Promoting Scientific Literacy

Scientific literacy is crucial in the modern world, as it enables individuals to understand and assess the scientific information that surrounds them. The promotion of science education is a fundamental step towards enhancing scientific literacy across all sectors of society, especially those in remote and underprivileged areas. As stated by a few researchers, academic institutions, and scientific organizations should undertake initiatives to foster science education at all levels (Burgin, 2017; Rayner & Wall, 2017). The promotion of science education at all levels of society, including in remote and underprivileged areas, is necessary to enhance scientific literacy. Science outreach programs aimed at the general public, especially those with low scientific literacy, can go a long way to address this issue (National Sample Survey Office, 2017). However, science outreach programs have a significant role in enhancing scientific literacy among the general public. These programs can be aimed explicitly at those individuals with low scientific literacy, who may have had limited access to quality science education. Science outreach programs such as exhibitions, workshops, lectures, and hands-on activities can make science more accessible and engaging to the public (Osuchukwu, 2020). These approaches can help address the issue of scientific illiteracy and make science more accessible to all levels of society.

The promotion of science education is essential for enhancing scientific literacy. However, science outreach programs aimed at the general public, especially those with low scientific literacy, can go a long way in addressing this issue. Therefore, there is a significant need for academic institutions, scientific organizations, and the government to promote science education and extend outreach programs to foster scientific literacy (Hancock, 2019; Martin & Durant, 1993).

3. Recognizing Cultural and Religious Factors

When communicating scientific ideas, it is important to recognize and consider the social and cultural factors (Tangcharoensathien et al., 2018). This approach would involve greater sensitivity to cultural and religious beliefs in different regions and would require a more nuanced understanding of the context in which scientific ideas are received (Gupta, 2008). This also includes a greater awareness and sensitivity to different cultural and religious beliefs held in different regions of the world. As such, a more nuanced understanding

of the context in which scientific ideas are communicated is necessary (Liu et al., 2019). In some cultures, or religious settings, scientific ideas may conflict with traditional beliefs, creating a potential barrier to understanding or acceptance. Therefore, it is important to frame and communicate scientific concepts in a way that is sensitive and respectful of cultural and religious values held in different regions (Tangcharoensathien et al., 2018).

One approach to enhancing cross-cultural communication of scientific ideas is through a process of cultural competence (Frewer et al., 2013). This refers to the development of an understanding of different cultures, religions, and values to ensure that messages are delivered in a way that is culturally appropriate. Cultural competency training can improve communication between culturally diverse groups and lead to more effective strategies for communicating scientific concepts (Frewer et al., 2013). Recognizing the influence of social and cultural factors when communicating scientific ideas is vital for effective communication. To address potential barriers, a greater understanding of cultural and religious values held in different regions is necessary, and the use of cultural competency training can improve communication and increase the effectiveness of science communication efforts.

4. Addressing Economic Disparities

Increasing funding for scientific education and research would go a long way in addressing the economic disparities that hamper science communication in India. Private funding through corporate social responsibility and philanthropic avenues could be explored to support scientific research and education in underfunded areas (Indian National Science Academy, 2008). Addressing economic disparities is crucial to promoting efficient science communication in India. One potential solution to advancing this effort is to increase funding for scientific education and research. According to Rai (2019), increasing financial resources can provide underfunded areas with necessary support, equipment and resources required for scientific experimentation and study. This approach would not only improve science communication but also promote socio-economic development in these areas.

Private funding, through corporate social responsibility and philanthropic avenues, could help in mobilizing resources for scientific research and education. Ghosh (2019) also supports this idea, and highlights that private funding has the potential to supplement government funding, thus increasing resources available for scientific education and research in India. One example of successful private funding in India is through the Tata Trusts, who have significantly invested in scientific research, education and outreach in

underdeveloped regions (Tata Trusts, India). The organization has helped bridge the gap between the haves and have-nots in terms of science education, promoting access to scientific knowledge widely across the country. Increasing funding for scientific education and research, especially in underfunded areas of India, can help address economic disparities and promote efficient science communication. Private funding, through corporate social responsibility and philanthropic avenues, can be explored to aid in closing the gap and providing equitable access to science education and research resources.

Conclusion

Science communication in India faces several challenges that must be addressed to create a more inclusive and democratic approach to science communication. Sociality is an essential aspect of science communication in the Indian context, and a more nuanced and socially sensitive approach is necessary to overcome the limits and constraints that hinder public understanding of scientific concepts. An integrated approach to science communication, promoting scientific literacy, recognizing cultural and religious factors, and addressing economic disparities through increased funding for scientific education and research are essential to ensure that science communication is socially aware. Ensuring that science communication is socially aware leads to better-informed public discourse and, ultimately, a more scientifically aware society.

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