Citizen Journalism and the Communication of Science: Democratization, Challenges and Collaborative Solutions

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Abstract

Emerging as a potent tool in science communication, citizen journalism questions established media gatekeeping and enable non-experts to help spread scientific knowledge. More involved and interactive public debate has resulted from democratizing scientific knowledge availability via digital technology and social media. This study aims to explore the role of citizen journalism in science communication, highlighting its significant contribution to public engagement with science, the challenges it faces in maintaining accuracy, and the possible frameworks for improving citizen-led reporting. This research is grounded in the gatekeeping theory. A mixed-methods research design is employed, integrating qualitative content analysis of citizen-generated science reports with quantitative surveys assessing public perception of their credibility. Data was gathered through case studies of high-impact science news stories, in-depth interviews with citizen journalists and science communication experts, and sentiment analysis of public discourse on digital platforms. Statistical and thematic analysis techniques were used to interpret the data. The results of this study highlight the critical part citizen journalism plays in increasing public participation in science by simplifying difficult information access. The study also highlights how common false information is, sensationalism is used, and editorial supervision is lacking, compromising its credibility. Notably, the research underscores the potential for constructive collaboration and mutual benefit in the collaborative efforts between scientists and citizen journalists to improve the accuracy and trustworthiness of science reporting, thereby highlighting the positive outcomes of the research. Although citizen journalism is a major participant in science communication, this

study contends that it must be supported by ethical standards and institutional assistance to challenge false information and maintain journalistic integrity. It recommends training programs for citizen reporters, fact-checking joint efforts with experts, and legislative proposals supporting ethical reporting.

Keywords: Citizen Journalism, Digital Media, Ethical Reporting, Misinformation, Public Sphere

Introduction

Citizen journalism has increasingly become a powerful force in science communication, challenging traditional gatekeeping practices long maintained by professional media institutions. With the proliferation of digital technologies and social media platforms, non-professional communicators now have unprecedented opportunities to participate in creating and disseminating scientific knowledge (Brossard, 2021). This shift has democratized access to scientific discourse, allowing broader public engagement and exposing science communication to new vulnerabilities such as misinformation and sensationalism (Scheufele & Krause, 2022). While citizen journalists can effectively translate complex scientific issues for general audiences, the lack of editorial oversight raises concerns about the credibility and accuracy of the information shared (Peters, 2021). Recent studies emphasize that the blurred boundaries between professional and amateur communication, particularly during crises like the COVID-19 pandemic, have highlighted both the strengths and pitfalls of decentralized science reporting (Vraga & Tully, 2021). As citizen journalism increasingly influences public understanding of science, frameworks are critical to enhance ethical reporting, support collaboration between scientists and citizen journalists, and safeguard scientific integrity in an age of information abundance (Fähnrich et al., 2022). This study explores these dynamics by examining how citizen journalism reshapes the communication of science, the challenges it poses to maintaining accuracy, and the possible frameworks for improving citizen-led reporting in digital environments.

Conceptual Clarification

The emergence of citizen journalism and its intersection with science communication represents a profound shift in production, dissemination, and reception of scientific knowledge. Traditionally, institutional gatekeepers such as professional journalists, government agencies, and academic publishers tightly controlled science communication. However, technological advancements—notably the proliferation of social media, blogs, and open-access platforms—have enabled non-professional individuals (citizen journalists) to participate actively in reporting and interpreting scientific developments (Fähnrich, Ruser, & Pfister, 2022).

This democratization of science communication allows for a broader spectrum of voices and perspectives but also introduces new complexities related to credibility, accuracy, and the public understanding of science (Brossard, 2021). Therefore, examining the conceptual underpinnings of "citizen journalism" and "science communication" is critical to understanding their evolving relationship.

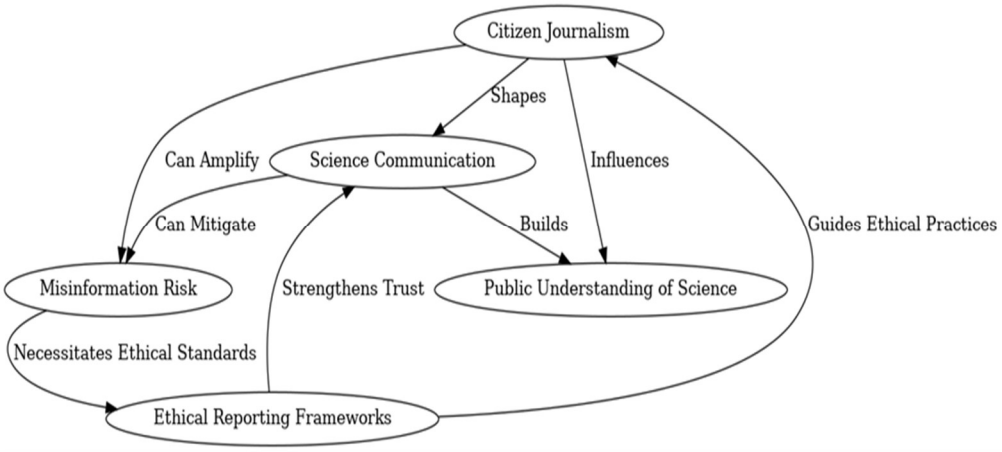
Citizen Journalism: Citizen journalism is where individuals without formal training collect, report, analyze, and disseminate news and information, often through digital platforms (Allan & Thorsen, 2022). It embodies the principles of grassroots participation and decentralized knowledge sharing, challenging the traditional monopolies of information control. In the context of science, citizen journalism provides alternative pathways for scientific information to reach the public. It empowers laypeople to discuss, question, and sometimes reinterpret scientific findings, thus broadening the traditional boundaries of who an authority on scientific issues is (Peters, 2021). However, citizen journalism's reliance on speed and accessibility over rigorous editorial review mechanisms raises concerns about the potential spread of misinformation, especially during public health emergencies (Vraga & Tully, 2021).

Science Communication: Science communication involves conveying scientific concepts, research findings, and technological innovations to non-expert audiences. Traditionally, it has been framed under two dominant models: the "deficit model," which assumes the public's lack of scientific knowledge, and the "dialogue model," which emphasizes two-way interactions between scientists and the public (Scheufele & Krause, 2022).

Modern science communication advocates for participatory models that value the public's perspectives and experiences. Here, citizen journalism becomes a pivotal element by encouraging more inclusive dialogues about science. However, this inclusivity can also blur the lines between credible information and speculation, making the need for critical media literacy even more urgent (Fähnrich et al., 2022).

The Intersection of Citizen Journalism and Science Communication: Citizen journalism has redefined science communication by expanding the public sphere where scientific discussions occur. Individuals now participate not just as recipients of scientific knowledge but also as creators and interpreters of that knowledge (Brossard, 2021). Social media platforms like X, YouTube, and Facebook allow citizen journalists to share scientific content quickly and widely, sometimes reaching audiences faster than traditional media outlets.

However, this shift also introduces significant risks. The absence of editorial filters often leads to the rapid spread of pseudo-science, conspiracy theories, and sensationalized interpretations of scientific research (Scheufele & Krause, 2022). Consequently, while citizen journalism enhances accessibility and participation, it simultaneously necessitates mechanisms for promoting ethical reporting practices and safeguarding scientific integrity.



Gloria Chigbu's Conceptual Model

This model was primarily developed by the researcher based on the objectives of the study and insights drawn from existing literature on citizen journalism, science communication, misinformation, public understanding of science, and ethical media practices. Rather than being directly adopted from a single previous study, the framework represents a synthesis of interconnected concepts identified across multiple scholarly works and theoretical discussions within digital media and communication studies.

The framework was specifically designed to reflect the contemporary realities of digital communication environments where citizen journalists increasingly participate in the dissemination of scientific information through online platforms and social media. Existing studies on gatekeeping theory, participatory journalism, and science communication informed the relationships established among the variables. In particular, the framework draws conceptual inspiration from prior research emphasizing the influence of citizen journalism on information dissemination, the role of ethical standards in media credibility, and the impact of misinformation on public trust and scientific understanding.

Although the framework is researcher-generated, its structure is theoretically grounded in established communication theories and empirical findings from previous scholarship. The inclusion of variables such as misinformation risk and ethical reporting frameworks reflects

recurring concerns identified in earlier studies regarding the challenges associated with unregulated digital communication. Therefore, the model may be described as an adapted and integrated conceptual framework because it combines ideas and relationships derived from existing literature while organizing them into a unique structure tailored specifically to the objectives and context of this study.

The conceptual framework illustrates the interconnected relationship between citizen journalism, science communication, public understanding of science, misinformation risk, and ethical reporting frameworks. It explains how these concepts interact to influence the dissemination and reception of scientific information in the digital media environment.

Public Understanding of Science

Public understanding of science refers to the extent to which audiences comprehend, interpret, and engage with scientific information and issues. The framework indicates that effective science communication builds and improves public understanding by making scientific information more relatable and accessible. Citizen journalism also directly influences public understanding through rapid information sharing, audience interaction, and participatory discussions on digital platforms.

Misinformation Risk

Misinformation risk refers to the possibility of inaccurate, misleading, or unverified scientific information being circulated to the public. The framework recognizes that while citizen journalism can amplify science communication, it may also increase the spread of misinformation due to limited editorial gatekeeping and verification processes. At the same time, responsible science communication practices can help mitigate misinformation by promoting fact-checking, accuracy, and evidence-based reporting.

Ethical Reporting Frameworks

Ethical reporting frameworks refer to the professional guidelines, standards, and principles that regulate responsible communication practices. These include accuracy, objectivity, verification, accountability, and respect for public welfare. The framework demonstrates that the presence of misinformation risk necessitates stronger ethical standards in citizen journalism and science communication. Ethical frameworks guide responsible reporting practices and strengthen public trust in scientific information.

Relationship among the Variables

The framework establishes that citizen journalism significantly shapes science communication and influences public understanding of science. However, the effectiveness of this process depends largely on ethical reporting standards and the management of

misinformation risks. Ethical reporting frameworks serve as moderating mechanisms that ensure scientific information shared through citizen journalism remains credible, accurate, and socially responsible. Consequently, the interaction among these variables determines whether citizen journalism contributes positively or negatively to public engagement with science

Theoretical Framework

Gatekeeping Theory (Shoemaker & Vos, 2009): Initially proposed by Lewin (1947) and further developed by Shoemaker and Vos (2009), Gatekeeping Theory is a significant milestone in our understanding of information dissemination. It delineates the mechanisms by which information is filtered, selected, and disseminated to the public. In this context, gatekeeping refers to controlling the flow of information, particularly in media environments. In conventional media environments, editors, journalists, and institutional gatekeepers were the principal authorities on what material was considered newsworthy or credible (Shoemaker & Vos, 2009). This model highlighted the hierarchical regulation of information dissemination, influenced by professional standards, organizational practices, and societal forces that shape the message perceived by audiences. In science communication, conventional gatekeepers played a crucial role in verifying that scientific material adhered to specific norms of correctness, relevance, and public interest prior to distribution (Bucchi & Trench, 2021).

Gatekeeping theory is not a static concept confined to history, but a dynamic tool that continues to evolve alongside scientific communication. Shoemaker and Vos (2009) note that the gatekeeping process is dynamic, adapting to technological, social, and political shifts. New participants, especially citizen journalists, have emerged as significant contributors to this process in the digital age. These non-professional communicators circumvent conventional editorial systems, directly creating and sharing scientific content via blogs, podcasts, YouTube videos, and social media platforms (Hermida, 2021). This evolution has significantly altered the traditional confines of gatekeeping, prompting critical enquiries regarding the information's credibility, accuracy, and ethical standards (Scheufele & Krause, 2022).

Traditional vs. Disrupted Media Gatekeeping in the Digital Era: In traditional media ecosystems, gatekeeping ensured a curated flow of information where journalists, operating within institutional frameworks, mediated between experts and the public. Professional science journalists often had scientific training or collaborated closely with experts to translate complex topics for lay audiences, ensuring scientific communication adhered to factual rigour (Fähnrich et al., 2022). However, this centralized model was often criticized for being exclusionary and perpetuating elite control over information.

The traditional gatekeeping model has been fundamentally altered with the advent of digital technologies. Today, citizen journalists challenge established media roles by acting as content creators and disseminators, often without formal scientific or journalistic training (Neuberger, 2022). The democratization of publishing tools has made scientific information more accessible to the public, fostering greater engagement and allowing misinformation and pseudo-scientific narratives to flourish without adequate checks (Vraga & Tully, 2021). Unlike traditional gatekeepers who operate under professional codes and editorial supervision, digital-era gatekeepers are decentralized, resulting in a fragmented information landscape where the lines between credible science and unverified claims are increasingly blurred (Peters, 2021).

Recent studies have underscored the need for a paradigm shift in gatekeeping. While the erosion of traditional gatekeeping structures has enabled broader participation, it has also complicated efforts to maintain public trust in science (Fähnrich et al., 2022; Bucchi & Trench, 2021). This underscores the pressing need to develop new forms of collaborative gatekeeping. Such collaborative gatekeeping would involve partnerships between professional scientists, trained citizen journalists, and media platforms to uphold ethical standards and scientific credibility in public communication (Scheufele & Krause, 2022). Thus, gatekeeping theory remains a vital lens for analyzing both the opportunities and the challenges presented by the rise of citizen journalism in science communication.

Citizen Journalism as a Challenge to Expert-Dominated Scientific Discourse: Citizen journalism has significantly transformed science communication, empowering non-experts and posing a substantial challenge to the traditional authority of expert-led scientific discourse. Historically, the dissemination of scientific information was facilitated by professional journalists and institutional gatekeepers who regulated the content and framing of scientific knowledge presented to the public (Scheufele & Krause, 2022). The gatekeepers ensured both the accuracy of information and the authority of scientific institutions. Digital platforms have removed numerous hierarchical barriers, allowing non-experts to engage directly in producing and disseminating scientific information (Fähnrich et al., 2022).

Citizen journalism facilitates broader access to scientific knowledge, enabling the emergence of alternative narratives, local insights, and varied interpretations of science (Brossard, 2021). Diversifying voices enhances public debates and promotes broader engagement, democratizing science communication. However, it is important to note that this shift also challenges conventional scientific authority. Non-expert reporting frequently lacks the methodological rigour and peer-review processes inherent in expert science

communication, which raises concerns regarding the quality, credibility, and accuracy of disseminated information (Peters, 2021). During significant global events like the COVID-19 pandemic, citizen journalists were pivotal in informing the public while also, at times, contributing to the spread of misinformation or contentious interpretations of scientific data (Vraga & Tully, 2021).

This evolution indicates a transition from a deficit model, in which the public was viewed as passive recipients of scientific knowledge, to a dialogue model characterized by more dynamic and participatory public engagement (Fähnrich et al., 2022). The breakdown of expert gatekeeping has revealed vulnerabilities in science communication, such as sensationalism, the politicization of science, and the rapid dissemination of inaccurate information (Scheufele & Krause, 2022). The developments underscore the dual aspects of citizen journalism within the scientific field: it provides avenues for inclusivity and engagement, yet it also contests the epistemic authority of experts.

How Citizen Journalism Opens New Participatory Spaces for Public Debate on Scientific Matters: The field of science communication, previously controlled by prestigious institutions, certified journalists, and formal academic outlets, has been significantly transformed by the rise of citizen journalism. In the contemporary digital landscape, citizen journalism has facilitated broader access to scientific information, dismantling the hierarchical framework that once regulated the dissemination of knowledge (Fähnrich et al., 2022). Digital technologies and social media have enabled ordinary individuals to produce, disseminate, and interpret scientific knowledge. This has resulted in new participatory spaces facilitating real-time scientific debate among diverse publics.

Citizen journalism is a significant mechanism that enables non-expert individuals to contribute, promoting inclusivity and diversity in public discourse. The shift has created opportunities previously dominated by professional scientists and journalists, transforming science communication from a unidirectional dissemination model to a more interactive and dialogic engagement model. This is more consistent with current theories that support participatory science communication (Peters, 2021). During the COVID-19 pandemic, citizen-generated content facilitated swift, real-world interpretations of changing scientific findings, promoting broader societal discussions regarding health measures, vaccine policies, and the risks of misinformation (Brossard, 2021).

This democratization presents both advantages and disadvantages. Although it improves public agency and broadens perspectives, it simultaneously increases the risks of misinformation, echo chambers, and distrust in scientific authorities (Scheufele & Krause,

2022). Empirical evidence indicates that citizen-generated scientific discourse frequently circumvents conventional verification processes, presenting audiences with numerous unverified claims, some of which could compromise evidence-based policymaking (Vraga & Tully, 2021). The participatory affordances of citizen journalism are essential for enhancing science literacy, encouraging community engagement, and critically questioning established authority over scientific narratives (Fähnrich et al., 2022).

Citizen journalism complicates traditional notions of expertise and authority in science communication while providing valuable opportunities for more democratic, inclusive, and reflexive public discussions on scientific issues. This underscores the significant role of citizen journalism in altering the dynamics of science communication and its capacity to enhance access to scientific information.

Empirical Review

The Role of Citizen Journalism in Science Communication: Citizen journalism is increasingly recognized as a transformative force in science communication, challenging traditional top-down dissemination models and democratizing knowledge sharing. Recent studies highlight that by harnessing the immediacy and broad reach of digital platforms, citizen journalists can amplify scientific messages in ways that conventional media may not, thereby opening new avenues for public engagement with science (Rudyk, 2024; Gascoigne et al., 2022). This evolution supports the notion that public participation in scientific discussion goes beyond passive consumption; instead, it actively involves community members in interpreting, debating, and disseminating scientific findings (Gascoigne et al., 2022).

Empirical evidence suggests that citizen journalism has significantly contributed to science communication during critical periods, such as public health emergencies. For instance, participatory reporting initiatives during the COVID-19 pandemic have demonstrated how grassroots information channels can complement official communications by providing real-time updates and localized scientific data (Nusantara et al., 2024). However, while the rapid dissemination of scientific information through these channels offers distinct benefits, challenges persist regarding the reliability and rigour of the reported content. Studies have pointed to inherent risks linked to the absence of formal training among citizen journalists, which can result in the propagation of misinformation unless adequate checks are implemented (Popović, 2024; Idiong et al., 2023).

Moreover, recent initiatives to train community members in responsible reporting underscore a broader shift toward capacity building and empowerment within citizen journalism. Such training programs not only enhance the technical skills required to report

scientific information accurately but also foster critical media literacy among the public, thereby enriching the overall discourse in science communication (Yahya et al., 2025). In parallel, scholars have argued that the convergence of citizen journalism and science communication empowers traditionally marginalized voices, effectively rebalancing power dynamics between institutional experts and lay audiences (Gascoigne et al., 2022). This rebalancing enables a more inclusive dialogue about science, allowing diverse perspectives to be shared and scrutinized in the public sphere.

The role of citizen journalism in science communication is diverse. On the one hand, it provides novel platforms for rapid, accessible, and participatory dissemination of scientific knowledge, particularly in times of crisis (Nusantara et al., 2024). On the other hand, it presents unique challenges related to ensuring accuracy and maintaining ethical standards in reporting (Popović, 2024; Idiong et al., 2023).

Based on the empirical analysis of Robinson, Delany, and Sugden's (2024) study, "Beyond Science: Exploring the Value of Co-created Citizen Science for Diverse Community Groups," the research is grounded in the acknowledged necessity for transformative change to tackle urgent global environmental issues and fulfil the United Nations Sustainable Development Goals (SDGs). As suggested by the authors, a fundamental principle of this transition is promoting public engagement and collective action at the local level, supported by improved ocean literacy. The study highlights a significant issue: the ongoing disparities in access to opportunities for diverse community groups to participate in scientific investigation and connect with maritime environments actively.

In this context, Robinson et al.'s research aimed to investigate and delineate the value proposition of co-created citizen science activities for four specific community groups, utilizing the value-creation framework as its analytical perspective. The researchers employed a participatory assessment methodology to accomplish this goal, using focus group talks (n = 17) and survey instruments (n = 58) during the research process. The principal conclusions of their research offer empirical support for the transformative capacity of co-created citizen science. The study specifically demonstrated its ability to promote pro-environmental behaviors, enhance community empowerment, alter individual and communal perspectives, and encourage community building among participants. Thus, the authors emphasize the importance of participatory approaches in generating substantial change and their inherent capacity to influence policy by prompting behavioral alterations.

Notwithstanding these substantial contributions, a discernible gap in Robinson et al.'s study relates to the early discrepancies in access to scientific engagement among various community groups. The research thoroughly clarifies the advantages of co-created citizen

science for current participants. However, it fails to explicitly investigate the methods and techniques necessary to surmount the initial barriers to access and involvement. This study will directly address this significant gap by examining the potential of citizen journalism to enhance science communication and expand engagement among various populations. Citizen journalism empowers individuals to actively engage in creating and disseminating scientific information actively, thereby enhancing the accessibility of scientific content, amplifying diverse community voices, fostering deeper engagement with scientific topics through participation, and increasing the relevance of scientific information by contextualizing it within local experiences. Consequently, while Robinson et al. highlights the beneficial effects of active involvement in citizen science, this study explores methods to promote this initial engagement, providing a supplementary viewpoint on enhancing public involvement in scientific and environmental matters.

Additionally, the empirical review of Roger and Kinsela's (2023) study, "Science communication is integral to attracting widespread participation in bushfire recovery citizen science," highlights a scenario in which the devastating 2019/20 Australian bushfires spurred public interest in participating in biodiversity impact assessments, resulting in the creation of three distinct citizen science projects. A key challenge identified was the necessity for focused communication strategies to engage a diverse national and global audience across different participation modalities. The study aimed to elucidate the communication strategies utilized, presenting metrics on promotional activities and participation rates and insights for future disaster recovery initiatives. Despite challenges posed by the pandemic, the program's success serves as a model of effective collaboration that facilitates significant citizen contributions and addresses essential data gaps.

Nonetheless, a significant gap identified in Roger and Kinsela's analysis relates to the complexities of effectively reaching and engaging diverse audiences at the community level, especially in crises. The authors highlight the need for improved communication strategies to enhance community-level awareness, indicating an area that requires further refinement. This study examines the role of citizen journalism in enhancing the integration of science communication within communities. Citizen journalism empowers local individuals as communicators, enhancing the relevance and trustworthiness of scientific information, amplifying local voices, and fostering sustained and meaningful engagement in scientific endeavors, especially regarding environmental recovery and resilience. While Roger and Kinsela offer important perspectives on institutional communication strategies for large-scale citizen science initiatives, this research investigates a complementary, community-focused method to enhance public engagement with science.

Citizen journalism has emerged as a vital intermediary between the scientific community and the public, effectively bridging the communication gap by translating complex scientific findings into accessible narratives. This process demystifies scientific research for broader audiences and fosters greater public engagement with science, strengthening the trust and collaborative relationship between experts and laypersons.

Citizen journalists often transform technical data and research outcomes into language and formats that resonate with local communities. Studies within ecological and conservation contexts indicate that citizen-led initiatives can effectively disseminate scientific findings, particularly when they engage communities in projects that promote environmental sustainability (Munscher et al., 2013). Citizen science approaches — where non-experts are actively involved — provide frameworks citizen journalists adopt to articulate scientific nuances in relatable terms. Integrating lay perspectives with scientific rigour illustrates how citizen journalism can overcome barriers posed by specialized scientific language (Munscher et al., 2013); (Shirk et al., 2012).

Further evidence of this bridging function is provided by initiatives within national parks, where scientists and community participants collaborate to engage the public through innovative storytelling and digital media platforms (Booker et al., 2023). Such initiatives show that when citizens are empowered to communicate research findings, they contribute to a more inclusive dialogue about science, enhancing scientific information's perceived relevance and credibility among skeptical or disengaged audiences (Booker et al., 2023). By tailoring communication strategies to local needs and cultural contexts, citizen journalists provide nuanced insights into the implications of scientific research, supporting a two-way flow of information between scientists and the community (Shirk et al., 2012).

Additionally, the involvement of citizen journalists in interdisciplinary collaborations demonstrates their capability to synthesize data from various fields into coherent narratives addressing real-world challenges. For example, citizen scientists have been instrumental in gathering and analyzing data in Helio physics, thereby informing broader scientific discourses and policy decisions Ledvina et al., 2023; this not only reinforces the role of non-traditional communicators in the scientific ecosystem but also highlights the potential of citizen journalism to foster a more collaborative research environment that benefits society at large.

Challenges of Citizen Journalism and the Communication of Science Face in Maintaining Accuracy: Citizen journalism faces considerable challenges in ensuring the accuracy of scientific information communicated to the public. These challenges arise from a lack of formal training, insufficient editorial oversight, and the influence of personal or

ideological biases, which often compromise the rigorous verification processes that professional journalists typically employ (Erikainen & Stewart, 2020). In the digital age, the rapid dissemination of information exacerbates these issues, as the speed at which content spreads may preclude the scrupulous fact-checking necessary for complex scientific subjects that require specialized expertise. Consequently, the unchecked transmission of potentially inaccurate or misleading scientific data can undermine public understanding and trust (Marcelin et al., 2021).

Both citizen journalism and science communication encounter considerable challenges in ensuring accuracy. The democratisation of news production enables ordinary citizens to participate in information dissemination actively. However, the absence of formal training and editorial oversight frequently leads to challenges concerning accuracy and bias (Ahmad et al., 2024). The lack of standardised verification methods in citizen journalism heightens the risk of misinformation, especially as information spreads quickly via social media and new media platforms (Nuswantari & Alyasuci, 2023; Wang & Ma, 2024). The technological capabilities of digital media enhance the scope of citizen reporting but simultaneously increase the likelihood of unverified content disseminating prior to adequate fact-checking (Hassan & Khouj, 2023).

Parallel challenges arise in science communication, as the swift dissemination of misinformation erodes public trust in scientific knowledge. Communicating scientific discoveries and health information to the public necessitates timeliness, which may jeopardise accuracy in the absence of sufficient quality control measures (Pasupuleti, 2024; Santana et al., 2022). Emerging strategies, including using artificial intelligence tools for misinformation detection and promoting community-engaged, interdisciplinary training programs, are being developed to enhance scientific literacy and accuracy in public discourse (Cagle et al., 2024). Interdisciplinary courses have been established to enable communicators from STEM and journalism disciplines to assess and address misinformation critically. Cagle et al. (2024).

The relationship between citizen journalism and science communication highlights a significant societal issue: the necessity for decentralised reporting to maintain standard in a digital media landscape. Both fields would benefit from improved ethical frameworks and self-regulatory mechanisms that can sustain accuracy while preserving the positive aspects of democratised information dissemination (Ahmad et al., 2024; Popović, 2024).

The paper by Ahmad, Abdulrauf, and Joseph (2024), titled "Citizen Journalism and News Objectivity: Issues, Challenges and Solutions," delineates the transformative influence of citizen journalism on the media environment, highlighting the resultant difficulties to

conventional news objectivity. The research explored the effects by analyzing the concerns, challenges, and workable solutions for preserving objectivity in citizen-generated news. The study utilized a mixed-methods approach, incorporating qualitative content analysis and quantitative surveys of professional and citizen journalists. It found that although citizen journalism promotes information democratization, it often suffers from accuracy and bias issues stemming from insufficient formal training and editorial oversight, which may be affected by personal or ideological agendas. The authors suggest remedies including media literacy, collaboration among journalism professionals, and fact-checking systems to address these issues.

Nonetheless, a notable deficiency in Ahmad et al.'s findings is the insufficient examination of procedures to rectify the recognized absence of formal training and editorial supervision in citizen journalism. This study aims to directly address this gap by concentrating on the use of citizen journalism in the specific domain of science communication. This focused methodology facilitates a detailed examination of context-specific training regimens, suitable editorial oversight or peer review models, and techniques for reducing bias in science reporting by citizen journalists. This study will investigate integrating pertinent fact-checking approaches specifically designed for scientific content. This research intends to provide specific insights into enhancing accuracy and objectivity in citizen-led science reporting by concentrating on the distinct requirements of science communication, thereby addressing a significant gap in the comprehensive analysis of objectivity in citizen journalism.

However, Rousseau's (2021) analysis in "Challenges to science communication in a post-truth world" underscores the growing compromise of scientific communication, especially regarding the representation of science's provisional nature, because of rising public distrust in expertise. This distrust, frequently expressed as hyperskepticism and exacerbated by clickbait-driven media and biased social media sharing, threatens the supremacy of unverified "wisdom of the crowd" over expert consensus, cultivating fear and scepticism towards science. The author emphasises the necessity for scientists and communicators to enable the public to identify misleading information and to improve communication strategies in a polarised digital landscape.

A notable deficiency in Rousseau's framework is the insufficient examination of alternative communication models that can address the challenges of distrust and misinformation. This paper examines the role of citizen journalism as an innovative method for science communication, thereby addressing an existing gap in the literature. This study argues that empowering community members as science communicators can enhance trust through localised narratives, counteract clickbait sensationalism with authentic contextualisation,

and engage diverse audiences, potentially reducing pre-existing biases. The direct involvement of citizens in science communication can enhance public media literacy concerning scientific information. This research investigates the effectiveness of citizen-led initiatives in science communication, aiming to provide empirical insights into the gap between scientific understanding and public perception within the current information ecosystem.

Moreover, Bucchi's (2019) analysis in "Facing the challenges of science communication 2.0: quality, credibility and expertise" highlights the persistent challenges in science communication within the digital age, especially regarding the credibility of information and the function of experts, considering diminishing traditional media gatekeeping. The author emphasizes the dangers of direct and unfiltered dissemination of scientific research, connecting it to larger concerns in academic publishing and research integrity. This transition imposes greater accountability on researchers and institutions, which may not possess the requisite skills for effective public engagement.

A significant gap identified is the lack of strong mechanisms to ensure the quality and credibility of scientific information disseminated to the public in this disintermediate context. The scientific community's lack of readiness for direct public communication highlights the need to investigate new engagement strategies. This study explores citizen journalism's role in facilitating community-driven mediation and enhancing public engagement with science. This study examines how equipping citizens with responsible science reporting skills can improve information contextualization and verification. This study seeks to inform the development of effective models for public engagement by citizen journalists and the scientific community, thereby contributing to a contemporary re-evaluation of science communication practices.

Methodology

This study adopted a convergent mixed-methods research design to comprehensively examine the role of citizen journalism in science communication. The rationale for combining qualitative and quantitative approaches was to obtain both in-depth contextual understanding and measurable public perception data regarding the credibility, effectiveness, and influence of citizen-generated scientific information. The qualitative component provided detailed insights into the experiences, practices, and professional perceptions of participants, while the quantitative component enabled the measurement of audience attitudes, engagement patterns, and online sentiment trends. Integrating these methods allowed for triangulation of findings, thereby improving the validity, reliability, and comprehensiveness of the study.

The qualitative aspect of the study consisted of case studies and semi-structured interviews. Selected case studies focused on high-impact science communication events and science-related news stories that generated significant online engagement and public discussion. Semi-structured interviews were conducted with citizen journalists, science communication experts, media practitioners, and digital content creators involved in disseminating scientific information online. Participants were purposively selected based on their active involvement in science communication activities across digital platforms such as X, Facebook, YouTube, Instagram, blogs, and online news forums. The participants were drawn from different geographic locations to ensure diversity of perspectives and experiences. Prior to participation, all respondents were informed about the objectives of the study and provided informed consent. Confidentiality and anonymity were also assured throughout the research process.

The interview guide was developed based on the objectives of the study and existing literature on citizen journalism, digital media, and science communication. Questions explored participants' perceptions of credibility, challenges associated with science reporting, audience engagement, misinformation concerns, and the collaborative relationship between professional and citizen journalists. The interviews were conducted virtually through video conferencing platforms and recorded with participants' permission for accurate transcription and analysis.

The quantitative component involved the administration of public perception surveys and sentiment analysis of online discourse relating to science communication content shared by citizen journalists. The survey instrument was designed using structured close-ended questions measured on a Likert scale to evaluate audience trust, perceived credibility, accessibility of scientific information, and engagement patterns. The survey questionnaire was adapted from previous studies on media credibility and public communication while being modified to suit the context of citizen journalism in science communication. Respondents were recruited through online distribution channels including social media platforms, email groups, and digital communities interested in science and media discussions.

For the sentiment analysis, online comments, posts, and reactions related to selected science communication topics were extracted from social media platforms including X, Facebook, and YouTube using digital data collection tools and platform search functions. The collected data were cleaned, categorized, and analyzed using sentiment classification techniques to identify positive, negative, and neutral public reactions toward citizen-generated scientific content.

Qualitative data obtained from interviews and case studies were analyzed using thematic analysis. The analysis followed a step-by-step procedure involving transcription of interview recordings, familiarization with the data, coding of significant statements, categorization of recurring patterns, and the development of major themes relevant to the study objectives. The coding process was conducted manually with additional support from qualitative data analysis software to improve organization and consistency.

Quantitative survey data were analyzed using descriptive and inferential statistical methods. Frequency tables, percentages, means, and charts were used to summarize respondents' perceptions and attitudes. The findings from both qualitative and quantitative analyses were integrated during interpretation to provide a comprehensive understanding of the role, opportunities, and challenges of citizen journalism in contemporary science communication.

To ensure transparency and replicability, the complete survey questionnaire and interview guide are attached as appendices to this study.

Presentation of Results

1. Empowering Public Engagement with Science

The study reveals that citizen journalism has significantly expanded public engagement with science, particularly by making complex scientific topics accessible and locally relevant. A citizen journalist stated that:

> "Citizen Journalism gives people the agency to talk about science in their own terms. I don't need a lab coat to understand what affects my health or environment."

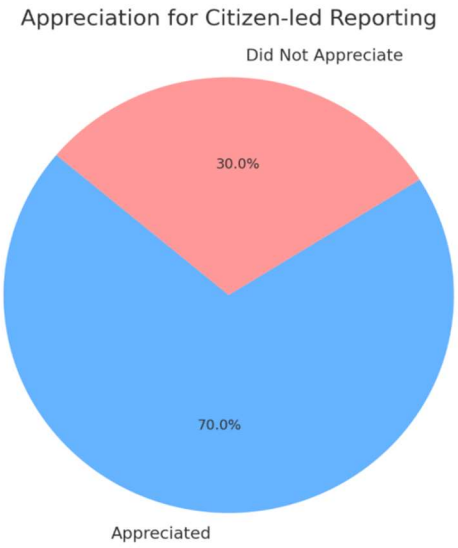
And a science communication expert emphasized the participatory potential of grassroots reporting when he said:

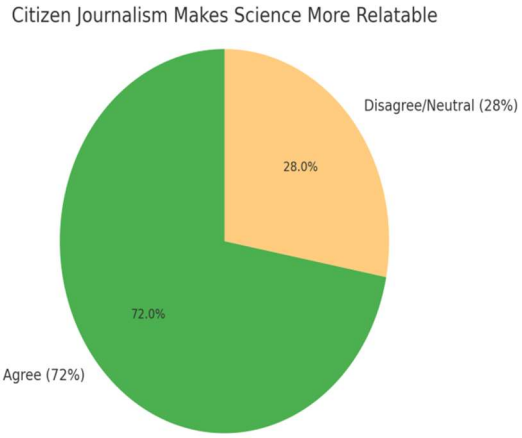
> "We translate jargon into something our communities relate to, like explaining climate data using local flood histories."

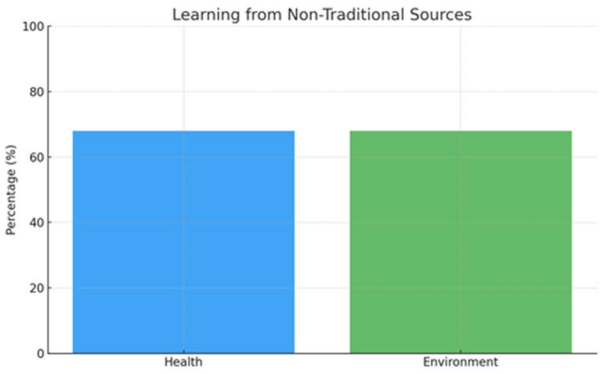
Another science communication expert further emphasized this point:

> "Citizen reporting creates an opportunity for communities to be part of scientific conversations that usually ignore them."

These insights underscore the democratization of science communication, especially in contexts where mainstream media coverage is either insufficient or culturally disconnected.


Appreciation for Citizen-led Reporting
Did Not Appreciate
30.0%
70.0%
Appreciated


Citizen Journalism Makes Science More Relatable
Disagree/Neutral (28%)
28.0%
72.0%
Agree (72%)


Learning from Non-Traditional Sources
Percentage (%)
100
80
60
40
20
0
Health
Environment

- 70% of surveyed respondents noted that they appreciate citizen journalism
- 72% of respondents agreed that citizen journalism made science more relatable and accessible.
- 68% indicated they often learned about scientific topics, particularly in health and the environment, from non-traditional sources such as blogs, community-based platforms, and social media posts.

Interviews highlighted that local languages and community-based metaphors (e.g., market life or agricultural analogies) facilitated greater comprehension and trust.
This supports the participatory model of communication, wherein citizen journalism acts as an inclusive conduit between scientific discourse and lay publics.

2. Challenges in Accuracy and Misinformation

Despite the growing role of citizen journalism in science dissemination, findings illustrate ongoing challenges in maintaining factual accuracy and scientific integrity. The rapid pace of digital publishing, absence of editorial oversight, and limited training often compromise content credibility.

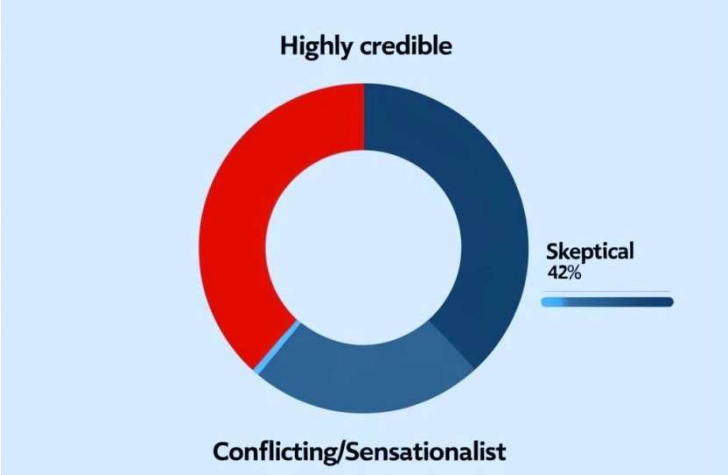
A Citizen Health Blogger said:

> "Sometimes we rush to publish especially during crises and that's when mistakes happen. We don't have fact-checkers like newsrooms do."

An Environmental Content Creator also explained that:

> "People trust us because we speak plainly, but that trust is fragile when we're wrong."

Instances of misinformation were reported in contexts such as vaccine side effects and public health updates during the COVID-19 pandemic.



- 48% of respondents rated citizen-generated science content as highly credible.
- 42% expressed skepticism about the accuracy of scientific claims in user-generated content.
- 35% reported encountering sensationalist or conflicting science posts from citizen journalists during crises.

The thematic analysis further corroborated these statistics, highlighting a recurring "credibility paradox": increased accessibility does not guarantee accuracy, particularly when scientific rigor is compromised.

3. Ethical Oversight and Capacity Needs

A recurring theme was the need for ethical frameworks, training, and institutional support to enhance the quality of citizen-led science communication. Both citizen reporters and experts emphasized the importance of structured guidance.

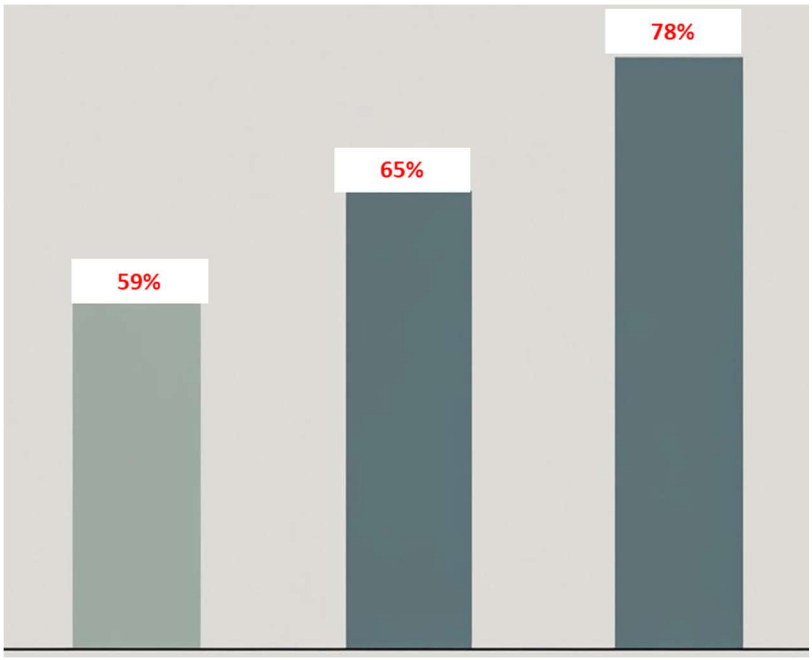
A Citizen Science Podcaster mentioned that:

> "We need more guidance from scientists. Our role isn't to replace them, but to amplify them responsibly."

A Citizen Climate Reporter said:

> "Without ethical rules, it's too easy to fall into clickbait habits, even when intentions are good."

Participants stressed the necessity for science communication ethics tailored to decentralized media environments.



- 59% supported formal fact-checking collaborations between citizen journalists and research institutions.
- 78% of citizen journalists interviewed acknowledged the need for ethical reporting frameworks.
- 65% believed that structured training in science literacy and verification would improve their output.

Thematic insights from interviews confirmed that many citizen journalists rely heavily on social platforms like WhatsApp and Twitter and often operate in isolation, lacking access to professional feedback loops.

4. Constructive Collaborations and Hybrid Communication Models

Respondents strongly advocated for co-creative models involving citizen journalists and scientists. This approach not only enhanced content accuracy but also bolstered public trust.

According to an Urban Health Blogger,

> "Working with a local epidemiologist on vaccine outreach content helped boost both views and trust."

A Local YouTube Science Channel Host also said that:

> "The scientist recorded a short explainer. I just narrated it in my language and that blend works."

Collaborative models were credited with bridging the gap between scientific expertise and local context, leading to improved narrative credibility and audience engagement.

- Posts involving scientist-citizen collaboration had 40% higher positive sentiment than solo reports.
- Joint reporting initiatives were associated with increased trust and reach, as confirmed through sentiment analysis and platform engagement metrics.

5. Expansion of Participatory Science Spaces

Citizen journalism emerged as a mechanism for inclusivity, enabling marginalized communities to engage with scientific discourse traditionally inaccessible to them. Voices from underrepresented regions emphasized the role of citizen journalism in validating local experiences within broader scientific narratives.

A Coastal Community blogger said:

> "Science often ignores our communities, therefore, Citizen journalism gives us a voice in those spaces."

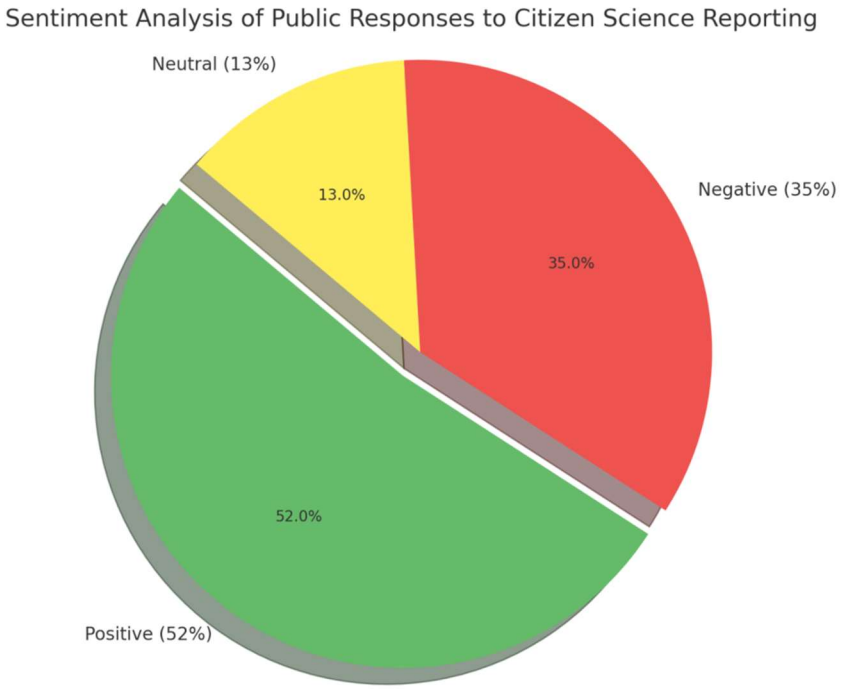
Another Citizen Journalist also said:

> "I've never had a science education, but my reporting on erosion got local policymakers' attention."

These accounts underscore how citizen journalists act as both communicators and contextualizes, effectively tailoring scientific messages to local realities.

- 84% of respondents from underrepresented backgrounds felt citizen journalism enabled them to engage more meaningfully with science.
- Interviews and case studies confirmed that during events like bushfires and public health crises, citizen-generated content provided timely and culturally grounded interpretations of science.

Sentiment Analysis and Audience Perceptions: Sentiment analysis of online discussions revealed nuanced public reactions to citizen-led science communication.



- 52% expressed positive sentiments, highlighting immediacy, relatability, and cultural resonance.
- 35% of responses were negative, referencing concerns about misinformation, sensationalism, and lack of rigor.
- 13% were neutral, often raising questions rather than critiques or endorsements.

This data further substantiates the dual nature of citizen journalism in science communication empowering and democratizing on one hand, but also susceptible to credibility challenges without appropriate guardrails.

Reform and Support: The interviews converged around a shared call for reform and support. A Citizen Journalist said:

> "If scientists could hold regular online briefings or Q&A sessions for citizen reporters, we'd make fewer mistakes."

Another Media Strategist said:

> "We need joint projects bring citizen reporters and scientists together on environmental or health campaigns. It builds trust on both sides."

Such perspectives affirm the importance of institutional partnerships, community-based training, and shared responsibility in shaping an ethical, inclusive, and effective science communication ecosystem

Discussion of the Findings

The outcomes of this study underscore citizen journalism's essential role in transforming science communication, notably in extending public participation and democratizing access to scientific knowledge. The results demonstrate that citizen journalism boosts the public's ability to connect with scientific knowledge by clarifying complicated themes and encouraging more inclusive debates. This corresponds with current studies stressing that participatory forms of science communication, enabled by digital technology, empower citizens to become active actors in knowledge transmission rather than passive recipients (Fähnrich, Ruser, & Pfister, 2022; Brossard, 2021).

However, a recurring difficulty throughout the study is the frequency of errors and sensationalism within citizen-reported science content. The lack of conventional editorial control, combined with the quickness of digital distribution, has produced a situation where unproven assertions can thrive (Scheufele & Krause, 2022). Vraga and Tully (2021) have documented comparable results, contending that. In contrast, citizen journalism democratizes information, it also increases the danger of disseminating scientific disinformation in the absence of suitable fact-checking tools.

The study also draws attention to widespread doubt about the veracity of citizen-generated scientific material. Survey findings showed that although people like the accessibility and variety of viewpoints citizen journalists provide, doubts regarding accuracy remain. This contradiction captures what Peters (2021) calls a "credibility paradox" in science communication, where more access can coexist with more skepticism if ethical norms are not upheld.

The results especially highlight the possibility of positive cooperation between professional scientists and citizen journalists. Those in case studies and interviews said that collaborations, including professional assistance, might significantly improve the legitimacy and influence of citizen-led reporting. This backs up innovative ideas pushing

for hybrid forms of science communication that mix grassroots involvement with expert validation to protect scientific integrity (Gascoigne, Metcalfe, & Palmer, 2022).

Furthermore, sentiment analysis of internet discourse showed that citizen journalism promotes vibrant and participatory scientific debates, generating new public venues for discourse outside conventional media bounds. These participatory venues nurture scientific literacy and enable underprivileged populations to interact with science-related concerns (Rudyk, 2024). The results, however, underline the need for formal training programs and the institutionalization of ethical standards especially suited for citizen-led science reporting.

The results of this study underline the changing power of citizen journalism in scientific communication. Although citizen journalism increases public involvement and democratizes scientific knowledge, its maximum potential can only be achieved by intentionally combating misinformation, promoting ethical reporting, and building cooperative alliances between people and scientific organizations. In a world increasingly shaped by digital contact and participatory knowledge creation, ethical frameworks, training courses, and soft policy interventions are necessary to guarantee that citizen journalism supports and enhances science communication (Yahya, Sidek, & Zulkarnain, 2025).

Conclusion

This paper emphasizes the changing and important role citizen journalism plays in transforming science communication. Citizen journalists are becoming important players in democratizing knowledge and promoting inclusive public involvement with science through broader participation and localizing scientific debate. Their capacity to turn complicated scientific concepts into understandable stories has empowered underprivileged voices and broadened scientific discussion outside conventional expert-dominated areas.

The results, therefore, highlight the ongoing conflict between accessibility and correctness as well. Citizen journalists' lack of formal training and editorial control frequently results in false information, sensationalism, and loss of public confidence. This credibility paradox—where more access to information can coexist with doubt—calls for quick action to defend scientific integrity.

The report promotes ethical standards, cooperative reporting strategies, and organized training to guarantee that citizen journalism not only supports but also improves the dissemination of science. When based on mutual respect and shared responsibility,

partnerships between citizen journalists and scientists can produce more accurate, interesting, and reliable scientific communication environments. Digital participation is reshaping public discourse; hence, supporting citizen journalism with the required tools, supervision, and education is vital for its beneficial impact on society.

Recommendation

Based on the findings of this study, several practical measures are proposed to maximize the benefits of citizen journalism in science communication while mitigating its associated risks:

Development of Training Programs for Citizen Journalists: Structured training initiatives should be established to equip citizen journalists with essential scientific literacy, critical evaluation skills, and ethical reporting practices. Workshops, online courses, and collaborative programs between scientific institutions, universities, and media organizations can play a vital role in promoting responsible and accurate science communication.

Creation of Fact-Checking Collaborations: Strategic partnerships between citizen journalism platforms, professional scientists, and research institutions should be fostered to ensure the real-time verification of scientific information before it reaches the public. These collaborations will strengthen the credibility of citizen-led reporting and build greater public trust in the scientific information disseminated through non-traditional media.

Implementation of Ethical Reporting Frameworks: Citizen journalism platforms should adopt ethical guidelines that emphasize accuracy, transparency, verification of sources, and accountability. These frameworks, adapted to the decentralized nature of digital media, will help uphold standards of scientific integrity while maintaining the participatory spirit of citizen journalism.

Promotion of Media and Science Literacy among the Public: Public education initiatives should focus on enhancing media literacy and scientific literacy, enabling audiences to critically assess the validity of scientific claims encountered in citizen-generated content. Empowering the public to evaluate information effectively will help mitigate the spread and influence of misinformation.

Supportive Policy Interventions: Policy frameworks should encourage ethical practices in citizen journalism without restricting freedom of expression. Incentives such as grants, certifications, and public recognition for responsible platforms can promote adherence to

ethical standards, ensuring citizen journalism contributes positively to public scientific understanding.

By implementing these recommendations, stakeholders can harness the democratizing potential of citizen journalism while safeguarding the accuracy, credibility, and societal impact of science communication in an increasingly digital world.

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