How To Be A Science Communicator

Final Project Report

Mehir Kalmış
Cristina Oliveira
30 Mayıs 2022

What is science communication? Who is science communicator?

Science communication is more of an art than a science, requiring scientists and science communicators to come up with new ways to communicate with the public. An excellent science communicator makes the audience aware of what is going on in the world. People can learn about fascinating developments that influence everyone through science communication. Science communication is essential for thinking critically in a society increasingly influenced by technological progress, which has a direct impact on people's lives.

The process of converting technical details on science-related topics into understandable messages and stories for the general public is known as scientific communication. It is a sub communication strategy that covers scientific domains such as the hard sciences, physical sciences, technology, health, environmental science, and more, with the purpose of bridging the gap between scientists and the general public. Professionals in science communication use their knowledge of complicated scientific topics, as well as strategic communication and narrative concepts, to create engaging and useful information about science and related disciplines. Science journalists, broadcast professionals, public relations specialists, environmental activists, and technical writers can use this mix of industry knowledge and practical communication skills to improve the public's comprehension of scientific research and results.

One of the most important responsibilities of science communication is to raise awareness of the natural sciences' importance in all parts of society and our daily lives. Science itself, scientific organizations, scientists, individuals, and even entire world benefit from increased public scientific awareness. Furthermore, without continuing to inform the public and decision-makers about science, recruiting new scientists and attracting fresh financing would become increasingly difficult.

Science communication is a broad topic that encompasses a variety of fields, including science outreach, science popularization, science publicity, and even scientific marketing. Education is sometimes included in this, as a subset of science communication that focuses on a specific target population. One of the unique characteristics of science communication work is that it covers a wide range of subjects, concerns, and areas. Science communication necessitates a thorough understanding of not only science, but also technology, journalism, and visual communication.

Science Communication Process

There are a variety of models that describe how science news is spread, both simple and complex. It is difficult to incorporate every component of science communication into one model since science news can be presented in a variety of ways, in a variety of settings, and to a variety of audiences. Science news in the media, for example, can come from a variety of places, including:

- Funding agencies and government organizations
- Press conferences;
- Scientists giving public talks
- Science journalists who carry out their own story research in scientific journals or from scientific preprint services like Astro-ph
- Journalists attending scientific conferences.

This illustrates the difficulty in describing the situation comprehensively with just one model.

Four Approaches of Science Communication

Science communication is the transmission of scientific findings to a largely passive and monolithic audience, usually through the formal education system or the mass media.

1- Diffusion Model: The communication process in this diffusion model is one-way, from a sender to a passive receiver. The goal of the communication is to increase citizens' 'knowledge of science,' in the view of improving public support for science, particularly for the large sums of money that go to it.

2- The Active Receiver: Individuals were considered as empty brains to be filled in the diffusion model. The active receiver, on the other hand, has long been acknowledged as an active participant in the communication process. Knowledge transmission from sender to receiver is more complicated than most people realize. There are various diverse audiences, each with their own set of experiences, expertise, desires, and requirements. So, if the sender wants her message to be heard, she must pay great attention to her audience. One of the outcomes, for example, is the avoidance of jargon. With more public attention comes more creativity in the 'presentation' of the message. A wide range of activities are planned with the audience in mind. The goal is 'public awareness of science,' not just 'public understanding of science.' The result is a transition

from one-way communication to two-way communication. The transmitter and receiver have more engagement, and the receiver is more aware of his audience. Because public comprehension of science is based on supply, public awareness of science is based on demand.

3- Knowledge as a social construct: Public awareness of science, like public knowledge of science, offers stories about scientific research findings. This method of knowledge transmission is unquestionably appropriate for basic science. But what if there's a lot of uncertainty, or if there's an ethical issue? Knowledge, they discovered in the social sciences, is not a product, but rather the result of a very intensive and constant interaction process. Communication is then a two-way street between scientists and laypeople. Communication is a business transaction. It entails a transition in science communication from product to process communication.

4- Open Participation: Within the transaction model, there is a trend toward open participation activities, in which scientists and non-professionals are treated equally in the communication process. The enhancement of the relationship between scientists and the general public, as well as the realization that science is not the only source of knowledge, are the driving forces. In fact, it is a component of our whole understanding of the world, and it must coexist with other types of knowledge (experiences, intuition, philosophic, ethical). Openness and transparency are two further characteristics of this type of communication.

While genuine dialogue between equal partners is the ultimate aim, alternative types of participation exist in which the participants in the communication process are less equal and the scientist still has a prominent role in establishing the agenda. For example, in 'Pubic engagement of science' events such as citizen juries or panels, this is the case. The goal is to inform the public before making a decision. It's still due to supply and demand. It is a two-sided communication process between professionals and non-experts. Real dialogue, on the other hand, is a multi-directional mode of communication. There is no definite sender or receiver, no expert or layperson; both are simultaneously sender and receiver, and dialogue partners.

Understanding, awareness, engagement, and participation are some of the ways to look at science communication. These distinctions can be represented by a two-dimensional diagram with two axes: product vs. process, and close vs. open

communication. All four science communication methods are critical for establishing a long-term link between science and society!

Science Communication in Universities

Individuals with a bachelor's or master's degree in scientific communication can choose from a wide range of job opportunities due to the vast nature of science and its connected areas. Biotechnology, public health, biomedical engineering, medical technology, environmental science, aerospace, neuropsychology, animal science, and other related scientific industries that require communication specialists are all options for those with a background in the field.

Scientific communication bachelor's and master's degrees train students for jobs in science journalism, environmental communication, public health, science policy, and scientific research publication management, among other fields. Bachelor's in scientific communication programs can prepare students for careers in the scientific communication industry or a similar profession by providing them with the knowledge and skills they need to succeed after graduation.

The fundamental courses for a bachelor's degree in science communication will address a mixture of communication and scientific principles. Foundational courses in digital media creation, technical writing and editing, science history, and the political and social aspects of science and scientific research, for example, might be taken by students. They usually also enroll in a course that introduces students to the topic of science communication. Students can then choose electives based on the type of scientific communication they want to pursue after graduation.

Scientific communication master's degree programs offer students to foundational and advanced theories, concepts, and research procedures that are crucial to effective science communication. Students learn how to use multiple channels (e.g., print, internet, social media) to target audiences with specialized scientific information and get an understanding of strategic writing and content creation methods. Furthermore, these programs frequently examine scientific fields such as ecology, epidemiology, climate science, medicine and human health, and technology and computer science, as well as how audiences interact with those fields and how different communication models can be applied within each discipline.

The master's degree in scientific communication differs from the bachelor's degree in scientific communication in that the latter is a degree that focuses primarily on the

study of science communication practices and research. General education prerequisites and electives that are not part of the student's major are included in bachelor's degree programs. These distinctions are attributable to the intrinsic disparities between a bachelor's and a master's degree. While undergraduate education aims to provide students with a set of critical thinking skills while also allowing them to focus on areas of special interest, a master's degree typically focuses in-depth on one field, allowing students to take more advanced coursework that prepares them for mid-level to advanced positions in industry or academia.

As a result, advanced human communication research methods, communication strategies and concepts, and storytelling across traditional and digital media, such as print, visual, broadcast, and social media, are typically included in a master's in scientific communication degree. Science writing, science and society, science reporting, multimedia reporting, environmental and life sciences, profile writing, investigative reporting, and other themes may be covered in class. Students in these graduate programs train to be professional communicators, able to use written, visual, and oral communication abilities to tell compelling stories about science, technology, the environment, medicine, and other complicated issues.

Skills for Graduates with a Degree in Scientific Communication	
Writing and editing	Scientific acumen
Data research and analysis	Grant writing
Multimedia production	Visual and graphic communication
Critical thinking and creativity	Advanced oral communication
Digital fluency	Technical writing

Effective Communication Skills for Science Communicators

1- Know your audience.

Remember that diverse groups of people will have different expectations for communicating with you. This is the most crucial rule for effective science communication. The general audience is curious about the influence of your study on their lives and societies. This communication could be delivered in the form of a professional presentation or an informal dialogue with friends and neighbors. The media is interested in learning why your study findings are significant, as well as how they differ from previous work. Potential investors want to know if your work will give them a good return on their investment. Peers will be interested in seeing if your work offers the possibility of future collaboration. Your company's leadership needs to know whether a project has met its objectives and should move on to the next phase, or if revisions are required. It's critical to approach each audience in a unique way and personalize your content to the group's specific interests.

2- Identify the goals of communication.

This phase builds on the process of determining the aims and objectives of communication by getting to know your audience. The purpose of some meetings, such as those with internal business leaders or possible investors, is usually clear: to share your results and secure support for further study. You may have one or more communication goals in other situations, such as public meetings or presentations: to educate, advocate, raise awareness, develop trust, influence policy or research, support change, or be a part of a discussion. In these situations, spend some time in advance researching the audience you'll be speaking to gain a better understanding of their viewpoint.

3- Start with the most important information.

After the scientists have provided background information, discussed their methodology, and acknowledged potential limits, the important findings appear at the end of the report in scientific or medical study. The same can be said for scientific conference presentations. The public, the media, and business stakeholders, on the other hand, digest information in a different order. The primary findings should come first, followed by the "So what?" section that explains why the findings are important, and then the supporting information that led to your key findings. Although the scientific community has the time and attention to commit to a lengthy paper or presentation, coworkers and citizens alike have a lot on their plates. As you create your communication approach, keep this in mind.

4- Avoid jargon.

In research papers, presentations, and on-the-job discussions, acronyms, initialisms, abbreviations, and technical vocabulary are prevalent. Effective science communication, however, avoids jargon and unfamiliar vocabulary in favor of concepts that are understandable to a wider audience. If scientific language is required, describe it in ways that are more easily understood. To see if a colleague, family member, or teammate with

a different professional or educational expertise understands what you mean, test your explanation on them. Don't be hesitant to experiment with different phrases until you find the ones that work best.

5- Be relatable.

Incorporate analogies and stories into your scientific communication to avoid scientific jargon. Finally, interactions can help scientists communicate more effectively. Instead of simply providing material in a lecture manner, it's critical to engage with an audience wherever feasible, such as by accepting questions following a presentation, reacting to pertinent comments on social media, and attempting to address instead of dismiss misconceptions. Conversations allow for a dialogue, which can assist in the audience's understanding of a scientific subject.

6- Provide visuals.

Another technique to eliminate jargon and make an audience familiar with a topic is to use charts, graphs, photos, and other visuals. For presentations in front of a big audience, visuals are also appealing; the slides in TED Talks, for example, utilize graphics and graphs but very few words.

7- Stick to three points.

Many of the most memorable expressions in writing and storytelling stick to three fundamental principles, from life, liberty, and the pursuit of happiness to stop, drop, and roll. It's no different when it comes to effective science communication. These three points could originate from a variety of places, including your research's three main findings, three uses for your product, or three key numbers that show a problem or solution. Your message should not only focus on the three topics, but it should also emphasize and focus on them throughout your communication.

8- Talk about the scientific process.

One of the most difficult aspects of science communication is that scientific processes are rarely complete. A reader or audience member may pose a question in the expectation of getting a simple "Yes" or "No," but the actual response is frequently conditional and necessitates further study. This gap can result in both dissatisfaction and mistrust. Rather than focusing merely on the results, be prepared to explain how you arrived at those conclusions, why you used specific research methodologies, and what actions you plan to take next. In addition to fulfilling an instructional purpose, such as assisting individuals in distinguishing between legitimate and suspect research, describing the scientific method can pique the interest of those with no prior knowledge of science.

9- Focus on the bigger impact.

Remember that the work in the lab or in the field, whether it's treating cancer or fighting climate change, is part of a broader problem. Even if they don't comprehend the methods of your research or the details of biology or chemistry, returning your talk to the big picture impact can assist an audience appreciate why your work is vital. Keeping the

big picture in mind will help the science communicator communicate science more effectively.

10- Develop an elevator pitch.

The elevator pitch is often associated with entrepreneurs looking for their next investor, according to science communicators. However, a concentrated statement short enough to "pitch" while riding in an elevator with someone can help them express the significance of their scientific work swiftly and efficiently. The elevator pitch also offers an opportunity to practice many of the tips highlighted above:

- Focus on the big-picture relevance, not the nuances of your research question and methodology.
- Describe the goals of your research, using analogies wherever possible in order to avoid the use of jargon.
- Explain why your research is exciting. Highlight the problem you are trying to solve and tie it back to why your work is relevant.

Career Path in Scientific Communication

A bachelor's or master's degree in scientific communication can lead to a variety of careers in journalism, physical or biological science, the environment, nutrition, medicine, engineering, veterinary science, biomedical technology, or any other science-related field. National laboratories, universities, state and federal organizations, online media companies, newspapers and journals, museums, television and radio stations, and other employers may offer job prospects to graduates.

Professionals with a professional degree in scientific communication can help the public better comprehend complex subject matter in science and even beyond by combining their expertise of a scientific discipline with effective communication strategies. Professionals in the field explore and consider how people engage with scientific discourse in order to deliver informative messages as effectively as possible, whether they are creating stories that reach large audiences through mass media or working in social research to survey how communities think about local scientific issues. Below is a list of potential careers for graduates of a scientific communication program to consider:

- **Science Journalist/Writer**: In and out of the journalism profession, science writers often work in communication professions. They use a range of materials, including as websites, news releases, social media posts, and investigative reports, to study and tell science-related stories. Coordinating with editors and

communication directors to maintain publishing schedules, identifying novel story ideas, and assessing and measuring content performance are some of their other responsibilities.

- **Scientific Copy Editor**: Scientific copy editors specialize in a variety of fields, including medical and environmental scientific communication. They copy edit, annotate, and fact-check scientific articles; they handle publication management databases; they obtain and review journal or publishing submissions; and they collaborate with writers and senior editorial staff.
- **Scientific Communication Director**: Scientific communication directors work for agencies, corporations, organizations, communication consultancies, and other businesses in both the public and private sectors, supervising scientific communication strategies. They establish plans to turn scientific findings into useful public messaging, engage with journalists and health investigators, and develop an overall strategy to communication strategies. Manuscripts, press announcements, conference presentations, research abstracts, and other materials may be included in these messages.
- **Scientific Communication Officer**: Scientific Communication Officers are in charge of conveying scientific knowledge to non-scientific audiences. They could work for universities, public relations firms, research centers, laboratories, print or online publications, or other science-related businesses. Analyzing and creating different content materials, such as newsletters, online articles, print brochures, recordings, or press releases, as well as pitching stories to the media, planning press opportunities for scientists, and conducting research into new potential media opportunities, are some of their responsibilities.

To sum up, scientific communication is a broad term that covers a wide range of sub-fields in the technical, medicinal, and environmental disciplines, among others. As a result, depending on their degree of education and professional experience, individuals who obtain formal training in scientific communication may be qualified for a variety of professions.

Bibliography:

- Scientific Knowledge and Cultural Diversity—The 8th International Conference on Public Communication of Science and Technology (PCST-8). (2004). Science Communication, 25(3). https://doi.org/10.1177/1075547004263197
- Hong, CP., & Wehrmann, C. (2010). Do Science Communication University Programs Equip Students to Become Professionals? A Comparison of 20 University Programs Worldwide. In MK. Patairiya (Ed.), Science communication without Frontiers (pp. 236-240). PCST.
- Trench, B. (2012). Vital and Vulnerable: Science Communication as a University Subject. In: Schiele, B., Claessens, M., Shi, S. (eds) Science Communication in the World. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-4279-6_16
- Mercer-Mapstone, L., & Kuchel, L. (2015). Core Skills for Effective Science Communication: A Teaching Resource for Undergraduate Science Education. International Journal of Science Education, Part B, 7(2), 181–201. https://doi.org/10.1080/21548455.2015.1113573
- MastersinCommunications.com. (2021, December 1). What is Scientific Communication? Careers in Scientific Communication. https://www.mastersincommunications.com/faqs/what-is-scientific-communication
- Illingworth, S., & Roop, H. (2015). Developing Key Skills as a Science Communicator: Case Studies of Two Scientist-Led Outreach Programmes. Geosciences, 5(1), 2–14. https://doi.org/10.3390/geosciences5010002
- Christensen, L. L. (2007). The Hands-On Guide for Science Communicators. Springer Publishing.
- Bennett, D. J., Jennings, R. C., & Bodmer, W. (2011). Successful Science Communication: Telling It Like It Is (Illustrated ed.). Cambridge University Press.