Scientific Communication

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Introduction

Writing is a key element in the formation of social realities, institutions and personal identities in almost every domain of professional life, and the sciences are no exception. “Scientific writing” can be defined as the reporting of original research in journals or more broadly to encompass other ways that scientists share research information with one another, such as review articles, Research papers, Short Communications, posters, and slide-based presentations. It must be clear, concise, and follow established formats. In many ways, its language forms a dialect all its own. Scientific writing is a process of organizing and shaping information. For example research articles, monographs, textbooks, scientific letters, thesis, Synopsis etc.

Scientific communication is the process of distilling technical information about science-related topics into

understandable messages and stories for public consumption. It is a field concerned with bridging the gap between scientists and the general public, and a multi-faceted form of communication that spans scientific fields such as the hard sciences, physical sciences, technology, health, nanotechnology, environmental science, and more.

Writing for any discipline involves a cycle. The writing cycle is intended to mimic the process that professional authors follow when writing. Planning, Writing a rough draft; Editing and proofreading. Writing cycle technique helps in strategic writing for carrying the entire process step by step. This also ensure less chances of error while writing as well as it provides a well structured frame for a writer/communicator in self-evaluation before final publishing.

Types of writing styles

There are four main types of writing styles which can be used for a specific purpose:

Expository

Expository writing is one of the most common types of writing. When an author writes in this style, it explains a concept. It does not include the author's opinions, but focuses on accepted facts about a topic, including statistics or other evidence. This type of writing focuses more on providing theoritical content to the audience by describing the concept behind the occurance. For example:

Explaining a mathematical formula may only include factual data without personal opinion.

Explaining concept on biological cycles, chemical reactions etc.

Descriptive

Descriptive writing is often found in fiction write-ups. When an author writes in a descriptive style, they are painting a picture in words of a person, place, or thing for their audience. It uses more words to describe an event in detail. Suggestions or conclusion given on scientific format may follow descriptive style of writing as author describes his personal opinion and recommendation on scientific findings. Case study is best example of descriptive writing format.

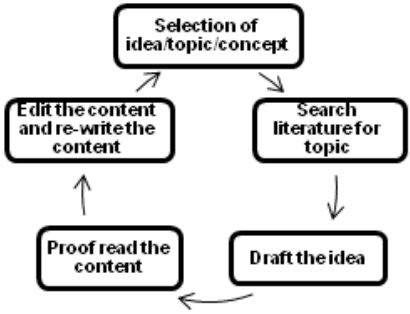
Persuasive

Persuasive writing is the main style of writing in academic papers. It try to convince the audience of a position or belief. Persuasive writing contains the author's opinions and biases, as well as justifications and reasons given by the author as evidence of the correctness of their position. The writing style is directed towards the third person, thing or situation to which the author is convincing the audience or listener. Frequent use of examples, graphs, flowcharts, diagrams, are features of this type of writing. Formal letters, diary entry, blogging, advertising are some example.

Narrative

Narrative writing is used in almost every longer piece of writing, whether fiction or nonfiction. When an author writes in a narrative style, they are not just trying to impart information, they are trying to construct and communicate a

story, complete with characters, conflict, and settings. Strong opinion of speaker is reflected and use of personal verbs are key feature in this type of writing.



Scientific writing process

Difference between scientific writing and other forms of writing:

Scientific Writing	Informal writing
It is type of technical writing which include facts, figures communicated effectively.	It is a type of unstructured writing which involves theoretical information only.
Precise and clear content is communicated in technical writing.	Long and descriptive content is disseminated.
It follows a well-structured format –Introduction, review, methodology, conclusion , summary etc.	It do not follow any specific format; entire content is written in one paragraph only.

It uses proper transitions of paragraph, margins.	Very less transitions are involved and the margins are uncertain.
It is used for seminars/ conferences/ research paper/ scientific articles.	It is used for casual chats and personal communications.

Rules for Scientific Writing

1. Use of 7 Cs in writing – clarity, correctness, conciseness, correctness, consideration, completeness and courtesy.
2. Avoid jargon in writing.
3. Correct use of tenses is prefered.
4. Proper use of paragraph transitions and margins should be checked.
5. Avoid difficult sentences,instead use easy sentences.
6. Avoid overwriting and try to write meaningful paragraphs for easy delivery.
7. Correct punctuations should be used.
8. Proofread the content properly.

Concept

Scientific writing is concerned with measurement and observation rather than opinion and supposition. Scientific writing is often privileged as a unique form of argument where the text is merely the channel which allows scientists to communicate independently with existing truths, relaying directly observable facts to the world.

The first reason for studying scientific writing therefore concerns its role in the disciplinary construction of knowledge.

All academic writers must display familiarity with the persuasive practices of their disciplines: encoding ideas, employing warrants, framing arguments and conveying an appropriate attitude to their readers and their ideas, in ways that their potential audience will find most convincing.

The second reason for taking an interest in scientific writing is that the discourses of the academy are extremely valued and influential ideological systems in the wider community.

Key elements of scientific communication

1. Precision: ambiguities in writing causes confusion and may prevent a reader from grasping crucial aspects of the methodology and synthesis. Short and precise sentences should be made to understand easily. Long detailed write-ups causes boredom in reader while short formats helps in retaining interest of audience for a longer period of time.
2. Clarity: concepts and methods in the sciences can often be complex; writing that is difficult to follow greatly amplifies any confusion on the part of the reader so clear explanation of scientific figures or facts allows a non-scientific audience to easily grasp the concept without any barrier.
3. Objectivity: any claims that you make need to be based on facts, not intuition or emotion. The communicator should be unbiased in writing. Both the sides of an

argument should be presented in format for understanding the background well.

Purpose

1. The aim of scientific communication is to generate new and reliable knowledge.
2. Simply to share the findings and excitement of science for use and benefit of population
3. To increase appreciation for science as a useful way of understanding and navigating the modern world.
4. To increase knowledge and understanding of the science related to a specific issue.
5. To influence people's opinions, behavior, policy preferences and to change their attitude towards science
6. To engage with diverse groups so that their perspectives about science related to important social issues can be considered in seeking solutions to societal problems that affect everyone.

Channels of Scientific communication

1. Informal channels – people's chats scientist in organization, informal or indirect sources, such as gossips, public announcements, indirect advertisements etc
2. Semi-formal networked communication such as e-commerce, e-blogs and websites.
3. Oral channels, such as conferences, seminars, lectures and personal interviews.

4. Printed or written channels, such as reports, journal articles, conference proceedings, books, theses etc.

Formal channels

Traditionally, the main forms of informal communication in science, technology, medicine etc. have been through verbal communication channels - personal contacts with colleagues and teachers - seminars, lectures, and discussions at conferences, fairs etc. These oral channels are often rapid and effective for conveying information. They allow a high degree of flexibility and are easy and pleasant to use. There is the possibility of a two-way communication between the speaker and the receiver of the information. However, oral communication is comprehensive; for example, it can be difficult to give detailed information about methods, constructions or results in a verbal presentation.

The formal pattern of printed communication is relatively slow.

At about the same time, some form of internal reportand/or seminar paper may be published. The average time between the completion of a research project and a published journal article is about eighteen months. It should be noted that there are some journals which specialize in more rapid publication - examples are Electronics Letters, PhysicsLetters and Spectroscopy Letters. The most important carrier of printed information is the journal article.

Primary Literature

Journals, Books, Reports (public), Special translations.

Secondary Literature

Abstract Journals, Computerized external literature, Special abstracts Shortened articles.

Journal articles/abstract

The abstract is a short summary of the article. An abstract must be a self-contained document, comprehensible without the body of the paper. An article must be readable in all parts.

The first scientific journals were published during the seventeenth century - Journal desSçavans, Paris 1665. During the eighteenth century a few more scientific journals appeared, amongst them such well known titles as Annales de Chimie (ET de Physique), 1790. A well prepared abstract should enable the reader to identify the basic content of a document quickly and accurately, to determine its relevance to the reader's interests, and thus to decide whether to read the document in its entirety. The abstract should succinctly state the principal objectives and scope of the investigation where these are not obvious from the title. More importantly, the abstract should concisely summarize the results and principal conclusions. The abstract should not include details of the methods employed unless the study is methodological, i.e. primarily concerned with methods. The abstract must be brief,

not exceeding 250 words or as otherwise defined by the journal.

Books

Book reviews evaluate recently published books. They offer a brief description of the text's key points and often provide a short appraisal of the strengths and weaknesses of the book. Book reports commonly describe what happens in the work, book reviews provides an analytical insights about a work. Book reviews are often published in magazines, newspapers, and academic journals.

1. Book reviews typically range from 500-750 words. They may be sometimes longer or shorter.
2. Book reviews aim to give readers a sneak peek at what a book is like, whether or not the reviewer enjoyed it, and details on purchasing the book.

Tips for writing

Read the book thoroughly. But before starting to read, consider the elements you will need to include in your review. These are: information about the author, his/her past works, awards, writing style etc.; Genre of the book were based on whether it is a fiction, nonfiction, romance, poetry, youth fiction, etc. While reading the book, take notes on key book's key points, characters, and/or themes.

While writing the review, you can start with a short summary or background of the work, but do not give too much

detail in the start itself. Most of the reviews limit the readers to one or two chapters of the book or lead the reader to important plot or point of the book. The final part of the review should include your opinion of the work.

Magazine

Writing for magazines is different from writing for newspapers. A newspaper is different from a magazine in content and style. Article can be longer than it ordinarily would be in a newspaper.Also, magazine is more advertiser-driven than the newspapers. So, content in large magazines is often very carefully checked against guidelines from those advertisers. Newspapers are more driven by readership.

Magazines have a longer shelf-life as subscribers like to keep them for long. This is not the case with newspapers.

Structure for magazine:

1. Length of write-ups: 500-3500 words
2. Writing should be gratifying, longer. You should use more relaxed grammar and punctuation.

Blogs

Science-related blogs have served as one way for highly motivated segments of the public to learn about, follow, and discuss science. These blogs blend the textual depth of online newspapers with the graphical and video capabilities of television, and they enable readers to interact in real time with the blog's author.

Need of scientific communication

1. It is required to comment on science –related issues, to give solutions to previously asked research problems and also to communicate scientific solutions to non-scientific audience.
2. Researches involves scientific and factual information for which these writing help in providing literature for study.
3. It helps in eliminating misconceptions or misleading information to people. It also tells about different roles of opinion leaders, scientist, researchers or communicators in disseminating information.
4. It is necessary to frame or reframe new concepts on subjects, to present new arguments to society.
5. Researcher need to communicate different methods to non-scientific audience for practicing scientific experiments.
6. To communicate scientific information in different formats in various field of study.
7. It is used to introduce new topics to the world example nanotechnology, nuclear science, nutrition science etc.

Significance of scientific communication

1. Science communication is important to share intellectual property, new ideas, concept, and model to audience with the help of various scientific writing formats.
2. To store of science-related information, and who value science and its role in accruing knowledge will be more willing and able to use scientific information (knowledge from science and how it is produced) in their decision making.
3. To increase knowledge and understanding of science related to a specific issue that requires a decision.

4. To influence people's opinions, behavior, and policy preferences when the weight of evidence clearly shows that some choices have consequences for public health, public safety, or some other societal concern.
5. To engage with diverse groups so their perspectives about science can be considered in seeking solutions to societal problems that affect everyone.