II-Chapter 02: Scientific English writing and vulgarization:

1. Definition of scientific terminology:

A scientific terminology is the part of the language used by scientists in the context of their professional activities. While studying nature, scientists often encounter or create new material or immaterial objects and concepts and are compelled to name them. Many of those names are known only to professionals. However, due to popularization of science, they gradually become part of common languages.

Among them, biological terminology is practiced when we learn about animals, plants, cells, or natural ecosystems, in order to set terms used for each province of this domain and for better understanding and more accurate network between all biologists of the life sciences. The language of biology is rigorous and most of the words can be broken into parts using their root words and by adding prefixes and suffixes.

Example: Biological terminology.

Field of Study	Terminology
Study of Blood	Haematology
Study of Liver	Hepatology
Study of Fungi	Mycology
Study of Algae	Phycology
Study of Virus	Virology
Study of Kidney	Nephrology
Study of Cancers	Oncology
Study of Universe	Cosmology
Study of Fruits	Pomology
Study of Birds	Ornithology
Study of Bones	Osteology
Study of Egg	Oology
Study of Eyes	Ophthalmology
Study of Soil	Pedology
Study of Brain	Encephology
Study of Nails	Cosmetology
Study of Air	Aerology
Study of Earth	Geology

2. Where scientific style is used:

Scientific style is used in contexts where knowledge, research findings, or technical information need to be communicated clearly, precisely, and objectively, especially in**:**

- **Academic and research writing :**
  - Research articles, dissertations, theses, laboratory reports, and conference papers.
  - Used to describe methods, findings, and conclusions with accuracy and neutrality.

- **Educational and reference materials :**

  - Textbooks, encyclopedias, scientific handbooks.
  - Lecture notes, academic curricula, and scholarly essays.
  - Ensures knowledge is presented systematically and consistently for learning.

- **Professional and technical communication :**

  - Grant proposals, technical reports, patents, and instruction manuals.
  - Used in medicine, engineering, agriculture, and environmental studies.
  - Guarantees reliability and reproducibility of information.

- **Oral and visual presentations :**

  - Conference talks, research seminars, and scientific posters.

The main scope and functions of the scientific style are pedagogical and scientific. With its help, it is possible to form a common intertextual space in which scientists from all over the world can communicate. Tacitly accepted standards for the formation of texts in this genre have been supported by specialists for many years.

3. Scientific paragraphs:

One of the most important goals in scientific writing is communicating complex ideas clearly. Preparing a strong structural texts and papers means that the reader can get a clear idea of where the argument is going, merely by skimming down the first line of each paragraph. For this, we have to:

A- Construct strong, clear topic sentences:

- Try to keep topic sentences simple.
- As a general rule, topic sentences should be clear enough that a reader can get the gist of your paper just by reading the first sentences of each paragraph.
- The topic sentence should identify the main point of your paragraph.
- Once you've written your paragraph, it's helpful to go back and check the meaning and the language.

B-Each paragraph should make one main point:

- In general, try to keep paragraphs between 3 and 5 sentences.
- If your paragraph is getting too long, it is probably making more than one main point, and it may be time to break it into two different topics.
- Connect your paragraphs with each other to achieve a coherent paragraph structure in your research paper.

C- Placing old information first and new information last:

- While writing multiple scientific details, we have to place the old information first and the new information last.

Example:

Farmers had been trying for the last years to provide optimal growing conditions for crops (Old information), by using soil additives as agricultural limestone in order to adjust the pH level (New information).

D- Use an active voice:

- A passive voice can make your writing sound vague and unclear, whereas an active voice provides a clear subject and verb, making your sentences more direct.
- Use strong verbs such as discovered; measured and analyzed, rather than verb phrases using forms of the auxiliary (to be) such as; is; are; was; and were.

E-Be analytical and critical at each part:

- Try to analyze and support each idea with evidence.
- Give your opinion, and make sure you link your analysis back to the question at hand.

4. Scientific Texts:

A scientific text is a written work that presents information, research findings, or explanations in a precise, objective, and structured way. Its purpose is to communicate knowledge based on facts, evidence, and logical reasoning rather than personal opinion or emotion. Scientific texts are usually produced by researchers, scholars, or professionals and are intended for an academic or specialized audience. They are often found in research articles, laboratory reports, textbooks, conference papers, and technical documents. A scientific text follows strict conventions such as the use of specialized terminology, clear structure, references to sources, and cautious, evidence-based conclusions.

4.1. How to study a short scientific text:

Studying a short scientific text requires more than just reading; it involves understanding, analyzing, and retaining key information. Scientific texts, even when brief, often contain specialized vocabulary, condensed explanations, and structured ideas that may be challenging at first glance. This can be done using the following steps:

1. **Read carefully**: Go through the text slowly and pay attention to the flow of ideas.
2. **Highlight key terms**: Mark new vocabulary, numbers, or important facts.
3. **Check unfamiliar words**: Use a dictionary or glossary to understand scientific terms.
4. **Find the main idea**: What is the text mainly about?
5. **Identify structure**: Notice if the text shows background, methods, results, or conclusions.
6. **Take short notes (Summary)**: Write down the most important points in your own words.
7. **Review**: Reread your notes and try to explain the text without looking at it.

5- Scientific hypothesis:

An idea about the natural world. This idea may come from physics, economics, psychology, medicine, or any other field that studies the natural or physical world. A scientist wants to find out whether an idea is correct and can actually predict expected outcomes in the natural world.

Therefore, a scientist will test the idea (hypothesis) by conducting experiments, making observations and performing statistical analyses that can confirm it to be true, or reject it. A scientific hypothesis is assumed to be true. Therefore, it must be consistent with all possible data in the empirical world which is inexhaustive. A scientific hypothesis simply cannot be proved. Statisticians attempt to solve this dilemma by adopting an alternate hypothesis (the null hypothesis). The null hypothesis is the opposite of the scientific hypothesis. It assumes that the scientific hypothesis is not true. The researcher conducts a statistical analysis of the study data to see if the null hypothesis can be rejected. If the null hypothesis is found to be untrue, the data support the scientific hypothesis as correct.

4.2. Scientific article:

A scientific article is a publication that supports a specific hypothesis and by which scientists communicate a significant portion of their experimentation. The scientific article must follow a uniformed structure with different parts that help readers to find expected information and analysis.

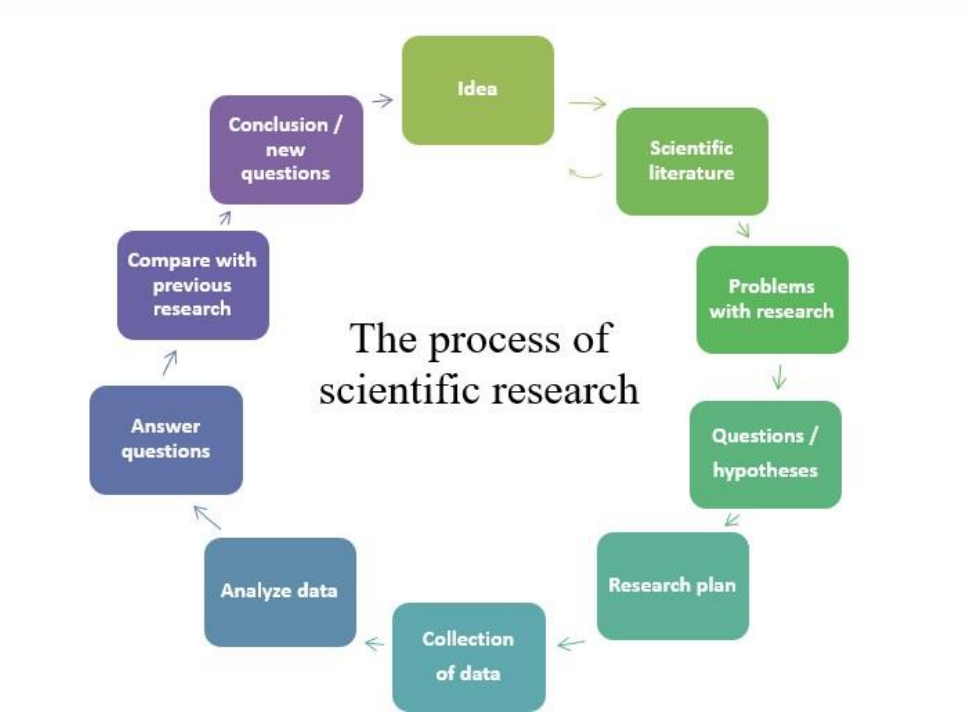

Figure 8. What You Need to Know to prepare a scientific article

4.3. Structure of a scientific article:

Most journals use a conventional TAKIMRD structure:

1. *Title*
2. *Abstract*
3. *keywords*
4. *Introduction*
5. *Methods*
6. *Results*
7. *Discussion*
8. *References*

1. **Title**

The title should reflect the topic to be presented in the scientific text and the scope of the paper. It should be very limited and

specific in order to translate the clear information developed. Name and affiliation of authors must be placed under the title.

2. Abstract

A brief summary of the purpose that represents what the study is about and explains why it matters. It should provide a sentence or two of the study's background, a brief overview of the basic methods used, a summary of results, and a part interpretation of the data. In general, abstracts consist of only one paragraph with about 50-100 words that should globally state the goals and the main conclusions of the scientific experimentation.

3. keywords

A list a few words or phrases placed at the end of the abstract, which indicates the most important scientific concepts and terms in the abstract.

4. Introduction

This is where the authors sketch out the background of the study and explain the objectives of their investigation. It is important to have enough citations to develop and provide the arguments leading to the hypotheses tested. The introduction section is a historical study including previous research relevant to the problem and gradually narrows to the specific topic addressed by the report.

5. Methods

This section describes what, when and how it is done from the site study location and the numbers of organisms used to the equipment, the procedures and all the techniques applied. Every chemical reaction, experimental design, statistical method and program must also be identified.

6. Results

In this section, simply results of the investigation are reported without long interpretation or elaboration. They must be organized into tables and figures with essential statistical information in order to be understood and compared. Tables and figures must be located after the text in which they are introduced. They must also be accompanied with a brief legend.

7. Discussion

This section discusses the results and comments on whether the argument research supports the original hypotheses or answers the research questions. During this section, the authors are asked to examine the results in the context of other published studies. It is important to explain how the study adds to or supports, existing knowledge. It's also important to mention future prospects in order to continue deeper researches in the studied domain.

8. References

The Bibliography section present all the references used in the paper for the different sections. It lists and indicates information and details concerning the sources used in the article. Most journals require authors to follow the journals' Instructions and to be up to date to recent issues of the journal.

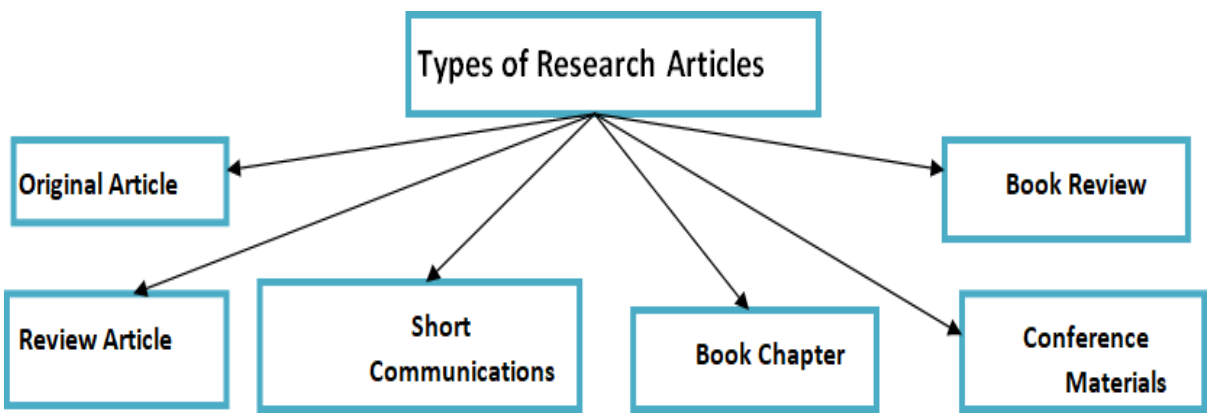

Figure 9. Most Common Types of Research Papers

4.4. Plagiarism:

Plagiarism is a form of academic misconduct in which the authors represent someone else's phrases as their own. It is acceptable to incorporate someone else's idea in your paper only if you clearly indicate that the words are someone else's and this by putting them in quotation marks and citing the source (s). Plagiarism can be detected on two forms:

- **Plagiarism of words**: when authors present someone else's exact words as if they were their words without quotation marks or documentation.
- **Plagiarism of ideas**: If the authors put someone else's ideas into their own words and then present the ideas as theirs.

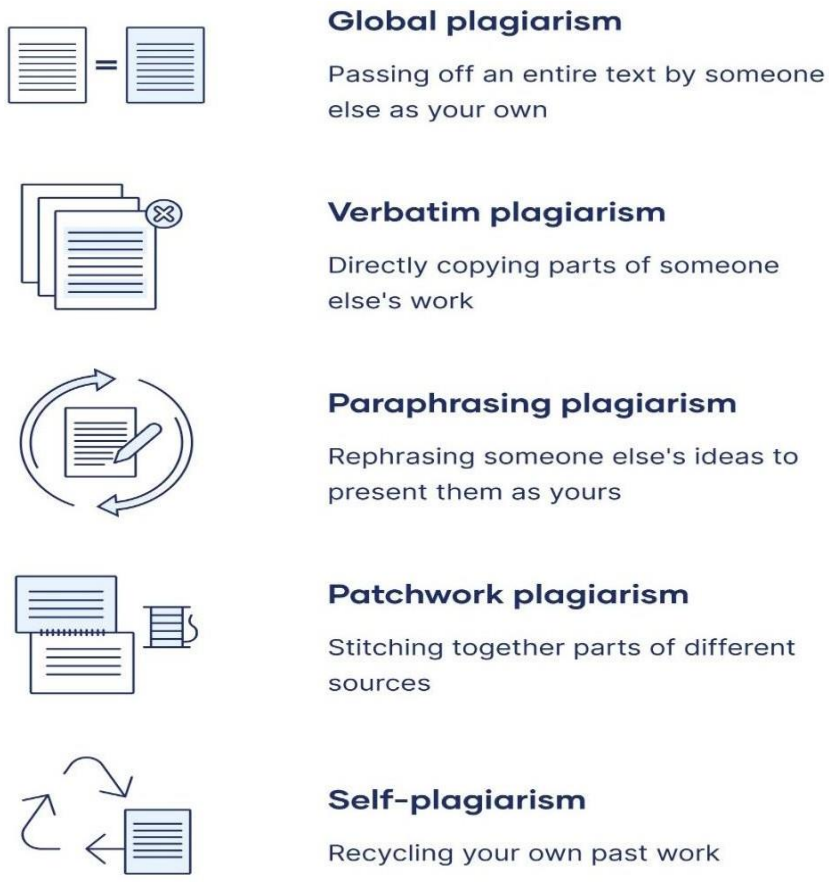

Figure 10. Plagiarism types in scientific English language

4.4.1. How do i avoid plagiarism?

To produce original and credible work, students and researchers must develop the ability to recognize, prevent, and avoid plagiarism by adopting the following practices:

a) Keep track of sources

- Compile a list as you go.
- Be organized.
- Label ideas and corresponding sources.
- If possible, use primary source.

b) Quote and paraphrase correctly

- Fully rewrite the source text when you paraphrase.
- Use quotation marks for quotes.
- Always add a correct citation.
- Don't take information out of context.

c) Add correct citations

- Follow the guidelines of your citation style.
- Always add a shortened in-text citation or footnote.
- Always add a full citation on the reference page.
- Use a reliable citation generator, such as Scribbr's.

d) Use a plagiarism checker

- Detect accidental plagiarism.
- Fix mistakes.
- Add forgotten sources.
- Choose a reliable plagiarism checker, such as Scribbr's.

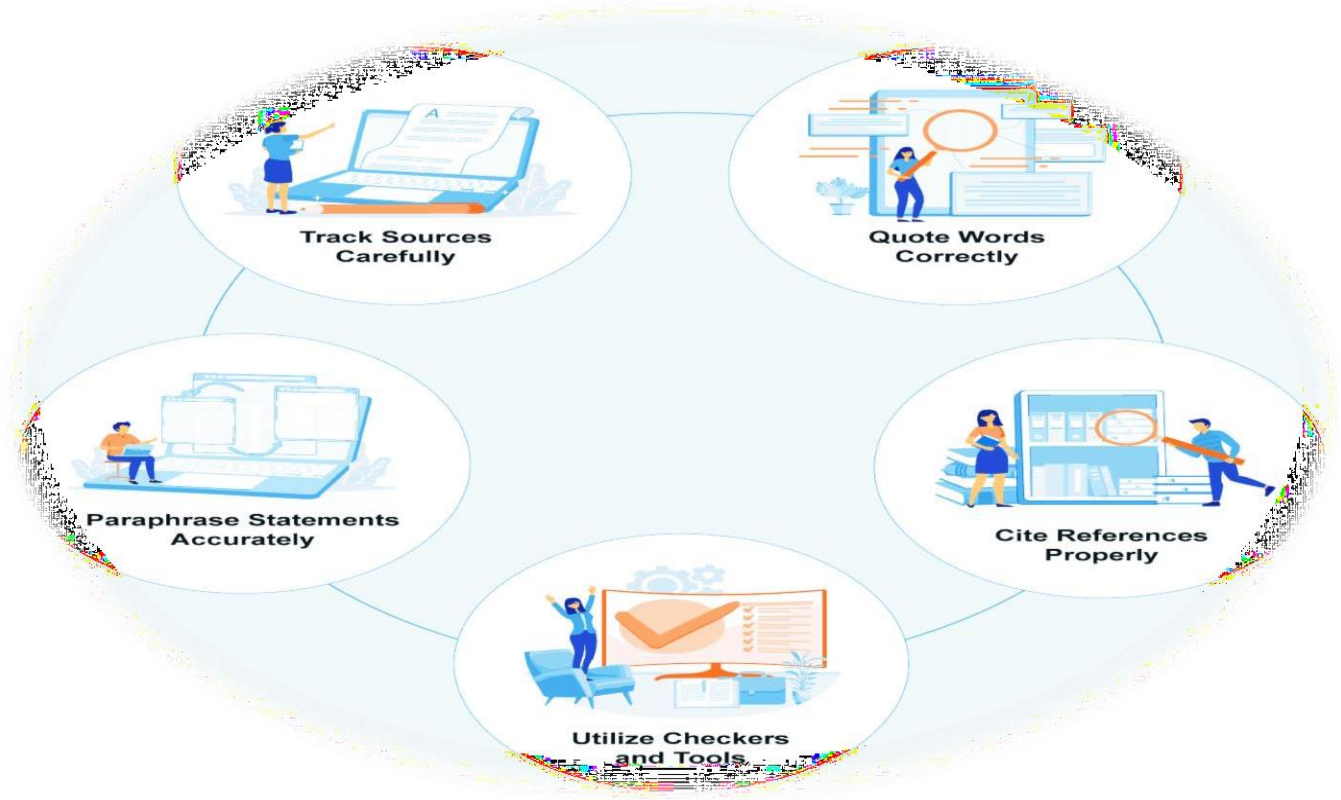

Figure 11. How to avoid Plagiarism

4.5. Scientific vulgarization:

Also known as popularization of science or science communication, is the practice of transforming complex scientific information into simple, accessible language for non-specialists. While scientific articles are usually written for researchers and professionals, vulgarization adapts the same knowledge so that the general public, students, or policymakers can understand it. This process is essential because science often deals with technical terms, complex data, and advanced methods that are difficult for people outside the field to grasp.

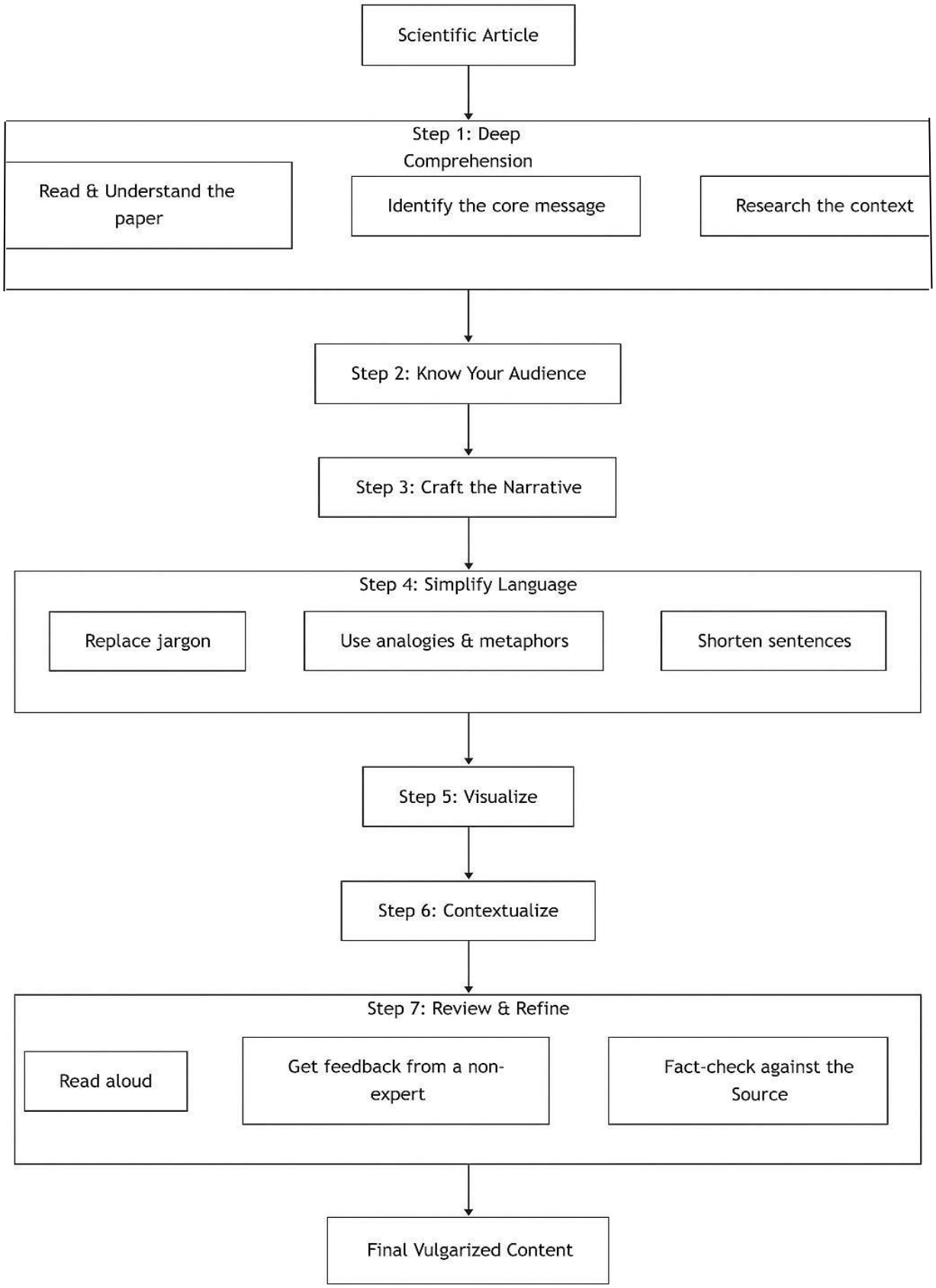

Figure 12. Principal steps for reading a scientific article

4.6. How to analyze a scientific paper?

Scientific texts are those written papers that contain information about concepts, theories or other series of topics based on scientific knowledge, which is why they are written in a special technical language for the audience to which they are addressed. The purpose of a scientific text is to inform, or to provide an explanation in a framework that holds all the different parts together. For analyzing scientific texts, we have to follow some steps and to answer the questions on the table below:

Table 04. Table questions for analyzing articles

Reference details	Author: Title: Year: Other bibliographic details:	
Background	Why did they do this research?	
Research Aims	What were their questions?	
Research Method	How did they investigate the questions? (e.g. experiments, surveys)	
Data Collection	How did they collect their data? (e.g. soil samples, species counts, mapping)	
Data Analysis	What did they do with their data? How did they analyse the data?	
Results/Findings	What did they *expect* to find and what *did* they find?	
Discussion	How does this research contribute to the field?	
Conclusion	What recommendations are provided for future research?	