

RESEARCH COMMUNITY, IIT(BHU), VARANASI

REPORT WRITING

What is a scientific report?

A **scientific report** is a type of academic paper that describes the process, progress, and results of technical or scientific research or the state of a technical or scientific research problem. It also includes recommendations and conclusions of the research. It is a factual paper and thus needs to be clear and well-structured. An essay on a topic presents arguments and reasoning, whereas a report concentrates on facts.

Before you set out to write a paper, there are two important things you should do that will set the groundwork for the entire process.

- The topic to be studied should be the first issue to be solved. Define your hypothesis and objectives (These will go in the Introduction.)
- Review the literature related to the topic and select some papers that can be cited in your paper (These will be listed in the References.)

Also, keep in mind that each publisher has its own style guidelines and preferences, so always consult the publisher's Guide for Authors.

Subsections of report

- Title
- Abstract
- Keywords
- Introduction
- Methods
- Results
- Discussion
- Conclusion
- Acknowledgments
- References
- Supplementary data

Title- *Your first (and probably the only) opportunity to attract the reader's attention.*

The title must be

- Concise, clear and precise
- Descriptive- Must reflect the contents of the manuscript
- Not too long- Long titles distract
- Remove all redundancies such as "studies on," "the nature of," etc. Never use expressions such as "preliminary." Be precise.
- Try to avoid technical jargon and abbreviations

Abstract- *Together with the title, the advertisement of the article*

It tells what you did and what the important findings in your research were while omitting the experimental details. It strongly influences whether or not your work will be further considered. It accurately reflects the paper's organization, emphasis, and content on a very small scale.

In an abstract, the two What are essential-

- (i) What has been done? (ii) What are the main findings?

TIPS-

- To write an accurate, useful, and academically sound abstract, first, complete the rest of the report.
- Keep it brief and avoid uncommon abbreviations and complicated language.
- Remember that the last sentence of the abstract contains a brief discussion of the interpretation/conclusion. Include technical terms into keywords.
- Use clear, precise wording

Keywords- *Label of the manuscript*

They are used for indexing your paper.

While listing keywords, **take care of the following-**

- Avoid words with a broad meaning and words already included in the title.
- Only abbreviations firmly established in the field are eligible (e.g., TOC, CTD), avoiding those which are not broadly used

Introduction- *This is what sets up the premise for the report and lays out your style, your approach, and all that can be expected from the paper and its contents.*

An ideal introduction starts off with a wide perspective and narrows down to the finer points as it continues. The idea is to provide a contextual background to your paper and to layout your initial ideas, your motivation for the study, how you've approached your thesis or problem, and the findings you expect from its execution.

A good introduction should answer the following questions:

- What is the problem to be solved? Try to provide an overall view of the problem
- Why is the problem important and timely?
- Are there any existing solutions? cite previous works
- How does your approach to the problem differ from other approaches? Point out drawbacks in other's methods
- What do you hope to achieve?

Tips -

- Do not use subheadings, lengthy texts because long intros put off readers
- Do not mix introduction with results, discussion and conclusion.

Methodology- *How the problem was studied, the **Process** description, not a lab manual procedure*

This section includes enough detail that readers can trust the results and potentially reproduce them.

Tips-

- If your paper is proposing a new method, you need to include detailed information so a knowledgeable reader can reproduce the experiment.
- However, do not repeat the details of established methods; use References and Supporting Materials to indicate the previously published procedures.
- Avoid repetition also, use "see above" when needed.
- It should be a very well-organized section, to make sense and allow easy reference. List the methods in the same order they will appear in the Results section, in the logical order in which you did the research.
- Present proper control experiments and statistics used
- It's important to use standard systems for numbers and nomenclature. for example-

- a. **For chemicals**- use the conventions of the International Union of Pure and Applied Chemistry and the official recommendations of the IUPAC-IUB Combined Commission on Biochemical Nomenclature.
 - b. **For species**-use accepted taxonomical nomenclature (WoRMS: World Register of Marine Species, ERMS: European Register of Marine Species), and write them always in italics.
 - c. **For units of measurement**, follow the International System of Units (SI).
- Use bold subheadings (on separate lines) to break up the methods.
 - Be precise, complete, and concise: include only relevant information—no unnecessary details, anecdotes, excuses, or confessions.

AVOID THIS COMMON MISTAKE-

- Do not add comments, results and discussions in this section.
- Incomplete and incorrect methods descriptions are highly criticized and can be the cause of rejection as well. Therefore, do not use proprietary, unidentifiable compounds.

Results- *Report, don't discuss or interpret*

1. The result includes important facts and objective observations that are unambiguously true.
2. Illustrate and summarize findings: organize data and emphasize trends and patterns with appropriate visuals.

TIPS-

- Here, present your findings, rather than explaining them.
- It should be organized in a logically coherent manner and must be chronological and easy to follow
- Integrate visuals with text: the text offers claims and general statements that the visual details support.
- Add supplementary materials freely, for data of secondary importance, so as to minimize the possibility of a lack of evidence to reinforce your conclusion.
- Use sub-headings to keep results of the same type together
- For the data, decide on a logical order that tells a clear story and makes it easy to understand. Generally, this will be in the same order as presented in the methods section.
- Illustrations, including figures and tables, are the most efficient way to present your results. More on figures and tables are given later.

Important tip- You must not include references in this section; you are presenting *your* results, so you cannot refer to others here. If you refer to others, it is because you are *discussing* your results, and this must be included in the Discussion section.

Qualities of a good Results section:

- Relevant data
- Clearly stated observations
- Meticulous organization
- Appropriate visuals with required labelling (e.g. titles, captions)
- Efficiently correlated text and visuals (no repetition, useful correspondence)
- Accuracy

Discussion- *Probably the easiest section to write, but the most difficult one to get right.*

1. Demonstrate your ability to synthesize, analyze, evaluate, interpret, and reason effectively.
2. Content options and a possible sequence:
 - Interpret your results: evaluate, analyze, and explain the significance and implications of your work--generalizations that you can draw from your results, principles that you support/disprove, conclusions about theoretical and/or practical implications.
 - Explain key limitations: questions left unanswered, major experimental constraints, lack of correlation, negative results.
 - Discuss agreement or contrast with previously published work; explain the significance of the corroboration or disjunction.
 - Offer general conclusions, noting your reasoning and main supporting evidence.
 - Recommend areas for future study and explain your choices.

TIPS-

- Avoid statements that go beyond what the results can support.
- Avoid nonspecific expressions eg- as 'higher temperature'. 'at a lower rate', 'highly significant'.
- Avoid sudden introduction of new terms or ideas; you must present everything in the introduction, to be confronted with your results here.
- Speculations on possible interpretations are allowed, but these should be rooted in fact, rather than imagination.

Conclusion- *Without it, readers will find it difficult to judge your work and whether it merits publication or not*

Sometimes, it is a separate section, sometimes the last paragraph of discussion, but nevertheless is essential to the report.

COMMON MISTAKE- Repeating the abstract or just listing experimental results in this section. Trivial statements about your result are unacceptable in this section.

TIPS-

- Provide a clear scientific justification for your work in this section, and indicate uses and extensions if appropriate.
- Future experiments may be suggested and those that are underway can be pointed out.
- Present global and specific conclusions can be proposed in relation to the objectives included in the introduction.

Acknowledgments- *Thank, but not to the extent where that would justify authorship*

Here, you thank people who have contributed to the manuscript. For example- you can include technical help and assistance with writing and proofreading, your funding agency or the agency giving you a grant or fellowship etc.

References- *The section which has more mistakes than any other part of the manuscript*

- Cite relevant references for statements of known results, hypotheses, methods, or background information.
- Avoid excessive self-citations and excessive citations of publications from the same region.

CAUTION

- Minimize personal communications
- do not include
- unpublished observations
- manuscripts submitted but not yet accepted for publications
- publications that are not peer-reviewed
- grey literature,
- Articles not published in English.

- You can use any software, such as EndNote or Mendeley, to format and include your references in the paper.
- Make sure you know what referencing format your professors expect.
- Finally, check the following:
 - The spellings of author names
 - Year of publications
 - Usages of "et al."
 - Punctuation
 - Whether all references are included

FIGURES, TABLES, AND GRAPHS- *A picture is worth a thousand words*

Since data is the driving force of the paper, illustrations are critical.

How to decide when to use figures and when to use tables to present your data?

Generally, tables give the actual experimental results, while figures are often used for comparisons of experimental results with those of previous works, or with calculated/theoretical values.

REMEMBER- Whatever your choice is, no illustrations should duplicate the information described elsewhere in the manuscript.

TIPS-

- Avoid crowded plots, use only three or four data sets per figure.
- Use well-selected scales.
- Think about the appropriate axis label size
- Include clear symbols and data sets that are easy to distinguish.
- Never include long boring tables (e.g., chemical compositions of emulsion systems or lists of species and abundances). You can include them as supplementary material.
- If you are using photographs, each must have a scale marker, or scale bar, of professional quality in one corner.

Lines vs histograms

Lines joining data only can be used when presenting time series or consecutive samples data. However, when there is no connection between samples or there is not a gradient, you must use histograms.

WRITING PROCESS

Different phases of planning in writing a research report

(i) Prewriting

- Make notes, scribble ideas: start generating text, drawing figures, and sketching out presentation ideas.
- Ignore neatness, spelling, and sentence structure--get the ideas down.
- Analyze the audience and purpose to focus your writing.

(ii) Writing

- Start with whatever section is easiest to write.
- Skip around to different sections as needed.
- Keep writing.

(iii) Revision

- Work on content first, then structure, and then style.
- Keep focused on your main purpose: communicating, reasoning, and presenting clearly.
- Ask for comments from people who will offer useful critiques.
- Circle back to pre-writing as needed.
- **A very exclusive tip** - Take care that you must not disclose your identity anywhere in the whole article/paper, by using sentences like, "In our previous work (citing your previous paper).." Write as a 3rd person, as the articles/papers are sent as anonymous submissions to other reviewers to review your work, if you publish them in conferences/journals

(iv) Editing

- Check all data for accuracy.
- Review everything for grammatical, mechanical, and usage errors.

Note - For checking the grammatical errors and making the language concise, precise and accurate, you can utilize the Grammarly subscription that the institute offers

ORGANIZE YOUR MANUSCRIPT AFTER YOU COMPLETE WRITING

SOME OTHER TIPS-

- Choose your topic wisely
- Be selective with your sources
- Never hesitate to ask for an advice

- No writing process works universally: whatever enables you to start and continue productively is fine. Consider what routines actually produce writing rather than procrastination, and do those.

References:

- [Writing a Research Report \(mit.edu\)](#)
- [10 Basic Scientific Report Writing Tips for Students | The College Puzzle \(stanford.edu\)](#)
- [11 steps to structuring a science paper editors will take seriously \(elsevier.com\)](#)