



## Sections

- Abstract – What did I do in a nutshell?
- Introduction – What is the problem and the history of attempted solutions?
- Materials and Methods (Experimental Procedures) – How did I solve it?
- Results – What did I find out?
- Discussion – What does it mean?
- Conclusion – What is summary or wrap-up?
- References – What prior work did I refer to?

## Abstract

\*\*Concise, complete report of an investigation that stands alone without further explanation.

\*\*If your abstract was the only part of the paper you could access, would you be happy with the information presented here?

\*\*It summarizes the entire paper and should include:

Basic justification for conducting the study

Research objectives

Basic methods used

Specific results

Major conclusions

## Introduction

Present background information.

Provide rationale for the study.

Include references (literature) but avoid an exhaustive review.

*What was being studied?*

*Why was it important?*

*What was known about it before doing this study?*

*How will this study advance knowledge of this topic?*

Present the nature and scope of the problem to be investigated.

Establish the context by providing enough background to orient the reader and justify the study.

State the goal/objectives and method of investigation.

## Materials and Methods

The goal of this section is for a competent scientist to be able to duplicate your results.

*Could someone else follow my words and perform the same experiment with the same results?*

Present specific information about materials.

Present methods in chronological order.

Be succinct, but be sure essential information is included.

Additional tips:

Avoid being overly wordy or detailed.

Avoid ambiguous terms (i.e., tube 1, 2, 3).

## Results

Open by presenting the big picture or overview of the experiments.

Focus on the theoretical question; orient and prepare the reader for the data that follows.

Data must direct the reader toward the solution to the problem.

Organize the data in logical steps that describe the trail of the investigation that led you to your conclusions.

Data can be presented in text, tables, figures, graphs.

Each figure, table, graph must be able to stand alone with its caption and legend.

Present only the data relevant to the conclusions drawn from the study.

Choose a method for clear presentation of data.

If results in text are too complex or cumbersome, use a table or graph.

Clarity in results is paramount.

You are presenting new information to a scientific community.

All other components are judged by results; the intro and methods tell why and how you got the results and the discussion tells what the results mean.

## Discussion

**\*\*Many papers submitted for publication are rejected because of the problems in this section.**

State your interpretation of the results clearly to lead the reader through your conclusions.

End the paper with a summary of the significance of the study.

*Do your results provide answers to your question(s)?*

*Do your findings agree with what others have shown? If not, do they suggest an alternative explanation or perhaps an unforeseen design flaw with your experiment?*

*Given your conclusions, what is the new understanding of the problem you investigated and outlined in the introduction?*

*If warranted, what would be the next step in your study?*

Compare your results with published materials.

Clearly contrast and compare your interpretations with previous studies, and

Discuss the theoretical implications of your work and practical applications that you foresee.

Present your interpretations as clearly as possible; present a summary of evidence for each major finding.

Make succinct concluding statements at the end of the discussion; these conclusions are what people remember most about your study.

## Conclusion

Summarize the main results of your paper in slightly more detail than in the abstract.

Make the conclusion understandable on its own, although you may refer to information in the article such as a device or a table of results.

## References

List sources, (papers, books, websites, and etc.) you studied while preparing the paper.

A proper citation includes: authors, title of paper or book, journal in which it appears or the book publisher, volume and page number, and year.