



The Journal of Cadet Research *Academic Excellence at the US Coast Guard Academy*

GUIDELINES FOR WRITING A TECHNICAL RESEARCH PAPER

Structure and Approach

Scientific research must begin with a defined research question, which results in a well-designed research protocol that plans the overall approach. This foundation should lead to a set of data from which the manuscript can be constructed. Manuscripts submitted to the JCR journals for consideration for publication must follow the following components.

- Title Page
- Abstract
- Introduction
- Methods
- Results
- Discussion
- Conclusions
- Acknowledgements
- References
- Tables and Table Captions
- Figure and Figure Captions

Title Page

The title of the manuscript should be short and simple, as well as authors and author affiliations. Provide approximately 5 key words, as well as a short title for the manuscript. Finally, provide complete contact information for the corresponding author.

Abstract

The abstract is typically a single paragraph. The first sentence should clearly state the objective of the experiment. If the experiment is based upon a hypothesis, which is greatly preferred, the hypothesis should be stated and followed with statements describing its basis and evaluation. The subsequent sentences describe how the investigation was carried out. The following sentences describe, with as much precision as possible without being verbose, the results of the experiment. The final sentences describe the significance of the results and the impact of this work on the general field of study.

Introduction

The introduction requires a short review of the literature pertaining to the research topic. The introduction is then best constructed as a descriptive funnel, starting with broad topics and slowly focusing on the work at hand. Perhaps three to four paragraphs are needed. One approach may be to start with one or two paragraphs that introduce the reader to the general field of study. The subsequent paragraphs then describe how an aspect of this field could be improved. The final paragraph is critical. It clearly states, most likely in the first sentence of the paragraph, what experimental question will be answered by the present study. The hypothesis is then stated. Next, briefly describe the approach that was taken to test the hypothesis. Finally, a summary sentence may be added stating how the answer of your question will contribute to the overall field of study.

Methods

This section should be a straightforward description of the methods used in your study. Each method should be described in a separate section. Begin, in a single section, with a statement of the materials used in the study. Next describe, in separate sections, each key procedure and technique used. Keep explanations brief and concise. If a specific experimental design is utilized, describe this design in the second section of the Methods, after the materials section. Similarly, if a theoretical or modeling component is utilized, it should also be incorporated in the initial portion of the Methods. Finally, describe the statistical analysis methods that were utilized to analyze the results, most likely in the final section of the Methods section.

Results

The Results section presents the experimental data to the reader, and is not a place for discussion or interpretation of the data. The data itself should be presented in tables and figures. Introduce each group of tables and figures in a separate paragraph where the overall trends and data points of particular interest are noted. You may want to indicate the placement of a particular table or figure in the text. For experimental studies, key statistics such as the number of samples (n), the index of dispersion (SD, SEM), and the index of central tendency (mean, median or mode) must be stated. Include any statistical analysis that was performed, and make sure to indicate specific statistical data, such as p -values. Note that each table and figure in the paper must be referred to in the Results section. Be concise.

Discussion

The discussion section should be relatively easy to write if the previous suggestions have been followed. In particular, look to the last paragraph of the introduction. If the work has characterized a phenomenon by studying specific effects, use the results to describe each effect in separate paragraphs. If the work has presented a hypothesis, use the results to construct a logical argument that supports or rejects your hypothesis. If the work has identified three main objectives for the work, use the results to address each of these objectives. A well-defined study that is described in the Introduction, along with supporting results that are presented in the Results section, should ease the construction of the Discussion section. Begin the Discussion section with a brief paragraph that again gives an overview to the work. Summarize the most important findings and, if applicable, accept or reject the proposed hypothesis. Next, identify the most interesting, significant, remarkable findings that were presented in the Results section, and contrast these findings in light of other studies reported in the literature. It is often informative if a discussion of the potential weaknesses of the interpretation is also included. Finally, at the end of the Discussion section, consider the other works in the literature that address this topic and how this work contributes to the overall field of study.

Conclusions

First, introduce the work and then briefly state the major results. Then state the major points of the discussion. Finally, end with a statement of how this work contributes to the overall field of study.

Acknowledgements

Provide a brief statement acknowledging the efforts of any participants or consultants who are not included as authors of the manuscript. State all of the funding sources for the work, ensuring that the statement adheres to the guidelines provided by the funding institution.

References and Tables

See JCR paper template that is attached (use Chicago Style).