

SCIENTIFIC WRITING: ORGANIZATION

Most scientific writing follows a standard IMRAD structure: Introduction, Methods and Materials, Results, Discussion. This structure can include many variations, some of which are described briefly below, but it is shared by everything from lab reports to professional journal articles. Each section of this structure serves a very different purpose, so think carefully about **why** you are putting a piece of information **where**. Common problems shared by student writers across the sciences include putting information in the wrong section and putting the same information in more than one section.

Title

- Precisely identifies research topic without using extra words.
- *Creativity is rarely appropriate.*

Abstract

- Should always be written after the paper.
- Should communicate all main points of paper.
- *In a journal article, this is the only part that most people will read. If it's not in the abstract, you might as well not have done it!*

INTRODUCTION

- Establishes that your research question is worth asking.
- Establishes that your methodology is an appropriate way of answering it.
- Specifies relevant features of geologic setting (sometimes a separate section)
- Shows how existing literature informs your research question.
- Shows how your approach fills gaps in existing research.
- Ends with short, clear, statement of the problem: what the project was looking for and why.

METHODS AND MATERIALS

- Establishes exactly what you did or plan to do
 - Starting Samples
 - Source
 - Characteristics
 - Method used to characterize
 - Materials used
 - Treatment of those materials
 - Limited detail for standard methods
 - Greater detail for new or modified methods
 - Specify brands and models of instruments
 - Specify measurements
 - Data analysis
 - Specify software
 - Specify statistical methods
- *Must be specific enough to allow someone else to replicate your work.*

RESULTS

- No interpretation. No procedures.
- No findings irrelevant to stated purpose of paper.
- Use tables, figures
- Explain information displayed in tables and figures precisely. Do NOT just refer the reader to the table or figure.
 - Avoid discussing how data was plotted: readers can see this.
 - Presentation should focus on data in figures and tables: what, precisely, does this data show?

DISCUSSION

- Evaluate and interpret data
- How data supports or conflicts with previously published findings
- Interpretive statements must be supported by references to specific data
 - NOT “Table 3 shows that.....”
 - BUT “the X% increase in X values shown in column X of Table 3 shows that...”
- Figures and tables must be referenced as precisely as possible
 - NOT “as shown above”
 - BUT “as shown in column X of Table 2”

Conclusions

- Importance of Findings
 - Major findings
 - What they mean
 - How they contribute
 - Avenues for further study
- Why research did or did not meet initial objectives
- This section is sometimes combined with the discussion section above.

Acknowledgements

- Usual in published work; less so in student work.

References

- Organized in citation style specified by teacher or professional journal