# **IMRAD (Introduction, Methods, Results and Discussion)**

Academic research papers in STEM disciplines typically follow a well-defined **I-M-R-A-D structure: Introduction, Methods, Results And Discussion** (Wu, 2011). Although not included in the IMRAD name, these papers often include a **Conclusion.**

**Introduction**

The **Introduction** typically provides everything your reader needs to know in order to understand the scope and purpose of your research. This section should provide:

* Context for your research (for example, the nature and scope of your topic)
* A summary of how relevant scholars have approached your research topic to date, and a description of how your research makes a contribution to the scholarly conversation
* An argument or hypothesis that relates to the scholarly conversation
* A brief explanation of your methodological approach and a justification for this approach (in other words, a brief discussion of how you gather your data and why this is an appropriate choice for your contribution)
* The main conclusions of your paper (or the “so what”)
* A roadmap, or a brief description of how the rest of your paper proceeds

**Methods**

The **Methods** section describes exactly what you did to gather the data that you use in your paper. This should expand on the brief methodology discussion in the introduction and provide readers with enough detail to, if necessary, reproduce your experiment, design, or method for obtaining data; it should also help readers to anticipate your results. The more specific, the better! These details might include:

* An overview of the methodology at the beginning of the section
* A chronological description of what you did in the order you did it
* Descriptions of the materials used, the time taken, and the precise step-by-step process you followed
* An explanation of software used for statistical calculations (if necessary)
* Justifications for any choices or decisions made when designing your methods

Because the methods section describes what was done to gather data, there are two things to consider when writing. First, this section is usually written in the past tense (for example, we **poured** 250ml of distilled water into the 1000ml glass beaker). Second, this section should not be written as a set of instructions or commands but as descriptions of actions taken. This usually involves writing in the active voice (for example, **we poured** 250ml of distilled water into the 1000ml glass beaker), but some readers prefer the passive voice (for example, 250ml of distilled water **was poured** into the 1000ml beaker). It’s important to consider the audience when making this choice, so be sure to ask your instructor which they prefer.

**Results**

The **Results** section outlines the data gathered through the methods described above and explains what the data show. This usually involves a combination of tables and/or figures and prose. In other words, the results section gives your reader context for interpreting the data. The results section usually includes:

* A presentation of the data obtained through the means described in the methods section in the form of tables and/or figures
* Statements that summarize or explain what the data show
* Highlights of the most important results

Tables should be as succinct as possible, including only vital information (often summarized) and figures should be easy to interpret and be visually engaging. When adding your written explanation to accompany these visual aids, try to refer your readers to these in such a way that they provide an additional descriptive element, rather than simply telling people to look at them. This can be especially helpful for readers who find it hard to see patterns in data.

**Discussion**

The **Discussion** section explains why the results described in the previous section are meaningful in relation to previous scholarly work and the specific research question your paper explores. This section usually includes:

* Engagement with sources that are relevant to your work (you should compare and contrast your results to those of similar researchers)
* An explanation of the results that you found, and why these results are important and/or interesting

Some papers have separate **Results** and **Discussion** sections, while others combine them into one section, **Results and Discussion.** There are benefits to both. By presenting these as separate sections, you’re able to discuss all of your results before moving onto the implications. By presenting these as one section, you’re able to discuss specific results and move onto their significance before introducing another set of results.

**Conclusion**

The **Conclusion** section of a paper should include a brief summary of the main ideas or key takeaways of the paper and their implications for future research. This section usually includes:

* A brief overview of the main claims and/or key ideas put forth in the paper
* A brief discussion of potential limitations of the study (if relevant)
* Some suggestions for future research (these should be clearly related to the content of your paper)

**References**

Wu, Jianguo. “Improving the writing of research papers: IMRAD and beyond.” Landscape Ecology 26, no. 10 (November 2011): 1345–1349. http://dx.doi.org/10.1007/s10980-011-9674-3.

Further reading:

* [Organization of a Research Paper: The IMRAD Format by P. K. Ramachandran Nair and Vimala D. Nair](https://doi.org/10.1007/978-3-319-03101-9_2)
* [George Mason University Writing Centre's guide on Writing a Scientific Research Report (IMRAD)](https://writingcenter.gmu.edu/guides/writing-an-imrad-report)
* [University of Wisconsin Writing Centre's guide on Formatting Science Reports](https://writing.wisc.edu/handbook/assignments/sciencereport/)