

#15 WRITING: LAB REPORTS AND SCIENTIFIC PAPERS

Most lab reports follow similar rules in their written structure. Different science departments vary in terms of what sections to include and the details needed in each section, and each department has specific rules about how to format your data, tables and figures. This handout discusses only writing, not data. However, most lab reports – and formal scientific papers – contain these basic sections.

Abstract

The Abstract briefly summarizes the whole lab report. One good way to write a draft abstract is to write one sentence for each section of the report: one sentence of Introduction (or importance/purpose), one of Methods, one of Results, one of Discussion, and one of Conclusion (or ramifications/importance). Then revise for clarity. You may need a sentence more or less for any section depending on the needs of your particular lab. Not all lab reports require an abstract.

Introduction

The Introduction presents to the reader the purpose of the lab and contextualizes it by describing: 1) the state of knowledge in the area of inquiry, 2) the unanswered question to be investigated, and 3) the importance of answering the question. Introductions may be “right side up” or “upside down.” They may first describe the lab’s exact purpose or aims, and then put those aims in context. Or, the lab may first present the importance of the question within the field of interest, then the exact aims/purpose of the lab.

Methods

Methods are a narrative description of how the lab was conducted. They provide all the information – and only the information – necessary for the reader to repeat the lab and obtain the same results. Methods should not be written like instructions: “First, add 3 grams of solute to 50 milliliters of solution.” Rather, they should be narrative: “Solute (3 grams) was added to the solution (50 milliliters).” Also, avoid unnecessary information: “We walked across the room to use the sink.” Methods should be packed with numbers, like quantities or durations, as well as names/makes of equipment used. Some departments and scientific disciplines, such as Chemistry, require Methods to be written in passive voice.

Results

The Results section should present (surprise!) the results. However, many students find this section challenging. Your tables and figures go here, or are referenced here if attached to the end of the report. However, you must describe each table/figure’s main points **IN WORDS**, even if the table/fig is right there! For instance, “Figure 1 shows a positive linear relationship between incubation time and total microbial count until hour 10.” Important numbers, correlations and findings, with units, must be described. Unless you are doing a combined Results and Discussion section, *avoid* the temptation to explain what the results mean – just state the key data and relationships. Captions for tables/figures should be short: put details in the text.

Discussion

The Discussion may be rolled in as “Results and Discussion” or “Discussion and Conclusions.” The Discussion explains what your results mean, or interprets the results. Discussion frequently

occurs AFTER results are presented. However, even in lab reports where Results and Discussion are presented together, it is good practice to separate each sentence presenting a result (piece of data) from a subsequent sentence that interprets that result. This order allows readers to draw their own conclusions from the data without the influence of the writer's biases. Although no science can be completely unbiased, this format helps retain the distinction between *What Actually Happened* and *What You Think Happened*.

Conclusion

The conclusion is your chance to sum up the whole lab report. Your major findings/results, and their meaning, should be summarized for the reader here. Then, contextualize those findings for the reader by describing, in broad terms, 1) their implications, 2) how they influence/will influence the field in question, and 3) whether there remain any unanswered questions or further research to be conducted. Try not to repeat your introduction, but take a broader view toward the future.

Works Cited

Be sure to cite all information you obtained from other sources, including your review of any other literature. Use correct style: American Chemical Society (ACS) or American Psychological Association (APA) citation styles are common formats for the sciences. Introductions and Conclusions in particular should contain many in-text citations to prior work, with the extended reference information listed in the Works Cited.

Passive Voice in Scientific Writing

When should passive voice be used in lab reports and scientific writing? Passive voice is often used in Methods to emphasize the science performed. For instance: "Three grams of solute were added" emphasizes the solute, whereas "I added three grams of solute" emphasizes the scientist. Scientists have also traditionally used passive voice rather than "I" or "we" throughout their papers to downplay the individual scientist in favor of the science itself. However, this tradition is changing. Some scientists now believe active voice improves clarity and acknowledges the inevitable role of the scientist herself as well as any biases she may bring to the work. Ask your professors for their preference on passive voice.