WRITING ACROSS THE CURRICULUM

Writing Lab Reports

It is a common misconception that students who are taking science courses do not need to be good writers. Scientists must be able to effectively impart their research, precisely explain a hypothesis, record data, and provide conclusions. To that end, the primary method by which scientists communicate important results is through articles published in professional journals.

A lab report is a presentation of original findings from a laboratory experiment or assignment. These findings are categorized into multiple sections following a format that reflects the rationality of a scientific hypothesis. When you are asked to write a lab report for a science class, it is important to check with the instructor to be sure of the style that s/he prefers.

The requirements can and do vary from class to class, but the goal of any lab report is to document your method and your findings and make known to your readers—in the case of a class assignment, your instructor and fellow classmates—the significance of those findings.

JOURNAL ARTICLE FORMAT

In a journal article format, lab reports are written as coherent "papers" with complete sentences and paragraphs. However, unlike most essay formats, the lab report is divided into six sections: title, abstract, introduction, materials and methods, results, and discussion. Graphs, tables, equations, and calculations are frequently included within the report.

Though this format is very similar to scientific research papers, an appropriate length for a lab report should not exceed five pages. Your report will be assessed on the presence of all required sections, the results of the experiment, the quality of the analysis and conclusions, and the mechanics and style of the writing.

Note: The Hunter College Library stocks journals on a wide variety of scientific topics, to which you can refer to become better acquainted with this format.

When writing in journal article format, keep the following points in mind:

- Use paragraphs and complete sentences and always try to maintain a "flow" from start to finish. Never write as if you were answering a series of arbitrary questions.

- The report should be fairly short and to the point. Although it should contain all the necessary information, it should not contain overwhelming amounts of detail.

- The writing must be in your own words. Even though everyone has performed a similar experiment, your article will be different, even from your lab partner's.

SECTIONS OF THE LAB REPORT

Title

The title should emphasize the focus of the experiment. It does not have to reveal the conclusion, although it may. Examples of good titles include: “A Determination of the Percentage of Zinc in Two Compounds by EDTA Titration” “An Experimentally Determined Formula for the Buoyant Force of Water”

Abstract

An abstract is a short summary (no more than 250 words) of the report you are writing. It should include an explanation of your experimental techniques, results, and interpretation. If your abstract is clearly written, your readers will be able to immediately assess the relevance of an article or lab report to their own research. After the abstract, the report itself begins. The sections of the report usually take headings, but your instructor may have a preferred format, so check before you begin.

Introduction

The introduction serves to present the general objectives of your scientific argument. You should provide sufficient background information for the reader, starting with the broad context of the study and leading up to the hypothesis. The hypothesis is a statement of what you think will happen in a given situation under specific operating conditions. For example: “The rate of respiration is affected by temperature.”

If you are having trouble developing your hypothesis, consider the following prompts:

- A previous experiment may have raised some additional questions. Briefly mention the results of the previous experiment and how they led to the current investigation.

- A certain theory may make a startling prediction or perhaps be unclear about what would happen in a given situation. Briefly explain how the theory relates to the experiment you decided to perform.

- The experiment might offer a solution to a “real-world” problem. Explain how.

Perhaps the simplest introduction can be written for an experiment performed out of curiosity. In this case, simply give the purpose of the experiment and how it fits into a larger scientific framework.

The abstract and introduction serve different purposes. The abstract is a summary of your report: everything written in the abstract must also be in your report. In other words, the report should be complete without the abstract, and the abstract should make sense without the report. The introduction presents your objectives and your hypothesis.

Materials and Methods

Your methodology provides appropriate chronological criteria for evaluating the data that was collected. Give complete details about how the experiment was performed, so that others will be able to carry out the experiment at a later date. However, you should avoid writing a step-by-step listing of your procedure. For example, it is not essential to explain a series of implied actions, such as when inoculating a flask, you first took out the stopper and subsequently replaced it.

Your lab manual may include many such details for your benefit, but you do not need to repeat them in your report. Sentences like “A sample of zinc iodide was prepared by heating a solution of zinc, iodine, and acidified water until all the water had boiled away” are acceptable. If specific apparatus or innovative techniques were used, mention them here.

Results

The results section should summarize your data, emphasize important patterns or trends, and illustrate and support your generalizations with explanatory details, statistics, and examples of representative cases. Remember not to compare your findings with those of other scientists, and not to discuss why your results were or were not consistent with your predictions.

Discussion

In discussing the quality of your data and procedure, you will be able to tell the reader what conclusions can be drawn from your results. Does the data support your original hypothesis? Why or why not? This is one of the most important sections, as it demonstrates your ability to understand and interpret the experiment’s results. In addition, you may be expected to discuss the work of other scientists. Are your findings consistent with theirs? Finally, suggest what form additional research on the topic might take.

For example:

> In this experiment, we attempted to minimize the role of friction, in order for the results to be more easily interpreted. It would be interesting to repeat the experiment using a high-friction system, such as a wood block sliding down a wooden ramp, to see how the results might differ.

Documentation

Under the heading “References,” list only source material referred to in your report. This list will most likely include, for example, your textbook or lab manual. Do not list sources that you did not cite in your text, even if they proved to be useful background reading.

Citation formats can and do vary from one academic field to another. In the sciences, APA (the American Psychological Association) and CSE (Council of Science Editors) documentation styles are routinely used. Always check to see which format your instructor prefers.

Note: The CSE offers three systems of documentation: citation-name, citation-sequence, and name-year. In all three systems, a reference list at the end of the paper provides all the information your reader needs to identify your sources. In-text references in your sentences show your reader which sources support your claims.

- In the **citation-name** system, number your sources alphabetically by author's last name in the reference list. In the sentences of your paper, cite these sources using the number from the reference list: e.g., the in-text citation [1] refers to the first source in your alphabetical list.

- In the **citation-sequence** system, number your sources in the reference list at the end of the paper by the order in which you refer to them in your paper. In the sentences of your paper, cite these sources using the number from the reference list. This means that the in-text citation [1] refers to the first source mentioned in your text.
- In the **name-year** system, list (but do not number) your sources alphabetically in the reference list at the end of your paper. In the sentences of your paper, cite these sources by giving the author's last name and year of publication in parentheses.

Appendix

An appendix is only necessary if you have leftover raw data that is relevant to your experiment, but that was not used in your report. If you choose to include appendices, be sure to make reference to them at least once in your text. It may be acceptable to affix a handwritten (be sure it is legible!) data sheet from your lab manual.

Note: All tables, graphs, and figures should be referred to by number. Keep the report relatively short. A few pages of text are adequate for a one-week lab. If you are feeling overwhelmed, try answering the questions from your lab manual or instruction sheet in order to get a better idea of what to address.