

Introducing a Lab Report

The introduction of a lab report states the objective of the experiment and provides the reader with background information. State the topic of your report clearly and concisely (in one or two sentences). Provide background theory, previous research, or formulas the reader should know. Usually, an instructor does not want you to repeat whatever the lab manual says, but to show your understanding of the problem. A good introduction should answer the following questions:

What is the problem?

Describe the problem investigated. Summarize relevant research to provide context, key terms, and concepts so that your reader can understand the experiment.

Why is it important?

Review relevant research to provide a rationale for the investigation. What conflict, unanswered question, untested population, or untried method in existing research does your experiment address? How will you challenge or extend the findings of other researchers?

What solution (or step toward a solution) do you propose?

Briefly describe your *experiment*: *hypothesis*, *research question*, general experimental *design* or *method*, and a *justification of your method* (if alternatives exist).

TIPS:

- Move from the general to the specific – from a problem in research literature to the specifics of your experiment.
- Engage your reader – answer the questions: "What did I do?" "Why should my reader care?"
- Clarify the links between problem and solution, between question asked and research design, and between prior research and the specifics of your experiment.
- Be selective, not exhaustive, in choosing studies to cite and the amount of detail to include. In general, the more relevant an article is to your study, the more space it deserves and the later in the introduction it appears.
- Ask your instructor whether or not you should summarize results and/or conclusions in the Introduction.
- The experiment is already finished. Use the past tense when talking about the experiment.
"The objective of the experiment was..."
- The report, the theory, and permanent equipment still exist; therefore, describe these using the present tense:
"The purpose of this report is..."
"Bragg's Law for diffraction is..."
"The scanning electron microscope produces micrographs ..."

This handout was adapted from the University of Toronto Engineering Communications Centre and University of Wisconsin-Madison Writing Center

Writing the “Discussion” Section of a Lab Report

The *discussion* is the most important part of your lab report, because here you show that you have not merely completed the experiment, but that you also understand its wider implications. The discussion section is reserved for putting experimental results in the context of the larger theory. Ask yourself: "What is the significance or meaning of the results?" A good discussion has these two elements:

Analysis

What do the results indicate clearly? Based on your results, explain what you know *with certainty* and draw conclusions.

Interpretation

What is the significance of your results? What ambiguities exist? What are logical explanations for problems in the data? What questions might you raise about the methods used or the validity of the experiment? What can be logically deduced from your analysis?

TIPS:

1. Explain your results in terms of theoretical issues.

How well has the theory been illustrated? What are the theoretical implications and practical applications of your results?

For each major result:

- Describe the patterns, principles, and relationships that your results show.
- Explain how your results relate to expectations and to literature cited in your Introduction. Explain any agreements, contradictions, or exceptions.
- Describe what additional research might resolve contradictions or explain exceptions.

2. Relate results to your experimental objective(s).

If you set out to identify an unknown metal by finding its lattice parameter and its atomic structure, be sure that you have identified the metal and its attributes.

3. Compare expected results with those obtained.

If there were differences, how can you account for them? Were the instruments able to measure precisely? Was the sample contaminated? Did calculated values take account of friction?

4. Analyze experimental error along with the strengths and limitations of the experiment's design.

Were any errors avoidable? Were they the result of equipment? If the flaws resulted from the experiment design, explain how the design might be improved. Consider, as well, the precision of the instruments that were used.

5. Compare your results to similar investigations.

In some cases, it is legitimate to compare outcomes with classmates, not in order to change your answer, but in order to look for and to account for or analyze any anomalies between the groups. Also, consider comparing your results to published scientific literature on the topic.

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