Better Writing – Laboratory Report Writing

Structure

The elements required in a laboratory report vary depending on the requirements of the unit or school. Each school will usually have a basic template for you to follow and should dictate what they expect from you. Because each school requires something a little bit different, an overview of a typical laboratory report has been provided below.

1.0 Introduction
   1.1 Aim
   1.2 Background Theory
   1.3 Equipment
   1.4 Method

The purpose of the experiment – why and how was it conducted?

2.0 Results

What did you find during the experiment?

3.0 Discussion

What is the significance of your results?

4.0 Conclusion

Concise recount of the experimental aim, outcome and whether your results were consistent with your hypothesis/existing theory.

5.0 References

Aim

The aim provides a succinct description of the purpose of your experiment. Typically, you will be tasked with verifying an existing theory by comparing experimental results with theoretical calculations for an experimental report. If a piece of software or equipment is used it is often referenced in the aim.

For example:

“The aim of this experiment was to examine the operation of controlled DC rectifiers for single-phase and three-phase inputs using Simulink.”
Background Theory

Background theory gives an overview of the scientific principles that were examined during an experiment. If your experiment was designed to test a hypothesis it also provides justification for the hypothesis – including relevant scientific literature that has been appropriately referenced.

In your Background Theory you will need to include:

- Enough background information to provide the reader with an understanding of the basic theory
- Properly referenced scholarly sources, for example: peer-reviewed journal articles, lecture notes, and textbooks.
- And the scope of your report.

Background Theory Example:

1.1 Background Information

Controlled DC rectifiers use thyristors instead of diodes to implement rectification. The operating characteristics of thyristors differ from diodes in one fundamental way – instead of automatically forward biasing when a positive voltage is applied they require both a positive voltage and a gate pulse to trigger the thyristor [1]. This has the added advantage of allowing the average DC voltage to be controlled by increasing or decreasing the firing angle of the thyristors [2]. While the turn on of the thyristors can be controlled via a gate pulse they cannot be turned off using a gate pulse, unless a commutation circuit is used [3].

References:


Note: The above references use IEEE formatting – check your unit outline for your referencing style.
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Equipment and Method

These sections of your report outline the equipment and materials used while conducting your experiment as well as the method you followed to obtain your results.

This information is important as it allows for others to reproduce your experiment and, in theory, get the same results.

In the Equipment and Method sections of your report you will need to provide:

✓ Enough context that your experiment could be repeated – including scope, limitations and assumptions made during the experiment

✓ And enough information on equipment used that a suitable alternative can be sourced.

Your aim, background theory, equipment and method will all be outlined in your introduction.

Results

This section of your report will contain the data you obtained during the experiment. This data should be presented in a way that makes it easily accessible to the reader – that is graphically or tabulated where possible. If there are multiple experiments to be conducted in the same laboratory, these should be separated into separate sub-sections to increase readability.

The contents of this section should be observations only; save the interpretation of your results for the discussion section. It is important that any statements in this section are clear, concise and accurate – avoid using vague terms, instead use specific language to illustrate your results to the reader.

For example, say:

“The difference between the simulation and theoretical results was less than 1%.” ✔

Rather than:

“The difference between the simulation and theoretical results was small.” ❌

Activity: Complete Activities One and Two, on the right-hand side of the page, to identify the elements of an introduction and examples of a good introduction for a Laboratory Report.
Discussion

The structure and content of your discussion section depends greatly on the aim of your experiment; thus, there is no “one size fits all” solution to writing a discussion section. However, three steps have been outlined in the following slides that will help you to perfect your discussion writing abilities.

Step 1: Link your results to your aim or hypothesis:
In your aim, you outlined what your experiment set out to examine. Are your results consistent with the aim or hypothesis outlined at the beginning of your report?

Step 2: Compare your results to existing theory, or previous results:
Do your results agree with the existing scientific theory?

Step 3: Identify any errors or inconsistencies in your results and provide a rationale or ways to improve the accuracy of your results:
What were the sources of uncertainty or error while conducting your experiment? This can include things like:

- Equipment tolerances
- Equipment failure
- And measurement errors.

Even if your experiment failed, it is still possible to achieve a good mark by analysing how and where the experiment failed and how it could be improved.

Some laboratory sessions may include a list of questions that must be answered. Typically these questions should be answered in your discussion section in paragraph form rather than simply listing the questions and their answers.

Conclusion and Recommendations

Your conclusion should be used to provide a succinct overview of the experiment, the results achieved and whether the experiment was successful. It may also include any recommendations you have for further research or refinements to the procedure used to obtain your results. It is important that you do not introduce any new material in your conclusion that was not discussed in your report.
References

When writing your report, it is important to cite any information that is not from your own research. This not only gives credit to the original author, it also increases the legitimacy of your findings. It is important to remember that a reference list contains ONLY sources actively used in your report; it is NOT a bibliography or reading list.

Different departments require different referencing styles. The most common styles used at Curtin can be found on the Curtin University Library webpage. Follow the link to view the library referencing guides relevant to your unit. If you are unsure which referencing guide to use, refer to your unit outline or ask your tutor.