

Quick Guide of Writing Tips on Laboratory Reports

Overview

A good laboratory report should enable someone who is knowledgeable in the area to follow precisely what you accomplished. The report should “tell” a story to that person, starting with why you did the lab, what were the findings and what were your observations and conclusions.

Structure of Report

The general structure of a technical report, such as a lab report, is as follows:

Cover page	Should include name, partner’s name, experiment name and number, date(s), as well as what were the responsibilities for the lab. You could be creative as use WordArt, ClipArt, and/or page borders to liven up the cover page.
Table of Contents	The best way to write a table of contents is to use the automatic feature in Word. This requires you to understand and use the headings style capability. By doing so, you can automatically update the table of contents if you add an additional page to the report.
Objectives	What are the objectives for the experiment, and what was the initial problem statement. Although this might be listed in a handout, you should try to rewrite it in your own words. List the main objectives as well as additional objectives you might feel worthwhile (i.e. you might be learning new applications of an instrument even though the main purpose is demonstrating circuit theory. You might want to list these as a bulleted list.
Pre-lab	Discussion of what the pre-lab theory and computer simulation (if applicable) demonstrated, and what you expected prior to performing the experiment. This section could include equations, which can be done either in equation editor, in a program such as Mathcad, or by hand. In all cases, the page numbers should be consecutive, and follow the table of contents.
Description of Experiment	What was the procedure followed, the equipment used (include model number and serial number), and a schematic of the circuit(s). This section is not results oriented. In this section, you should only describe how you went about the lab, not what was accomplished. You would write that information in the Discussion of Results section.
Discussion of Results	What went right with the experiment, as compared to the pre-lab, and what went wrong? Why? Compare the expected results with the experiment results, and explain the difference (what were the sources of errors). Shows calculations, graphs and data tables. It is best to have a continuous flow between discussions and objects such as data tables and graphs, as opposed to placing these graphs on a separate page.
Conclusion	What have you learned, were the objectives met, and did the results conform to theory. Are there any recommendations to this experiment?

If the report has several different experiments, or different values for various components or parameters (and therefore different results), you might want to consider combining several sections for each experiment or result. For example, if you were measuring the voltage output of two circuits, using a pulse input, you might want to have the pre-lab, description of experiment and discussion of results for the first circuit, and then repeat these sections for the second circuit. By structuring the report in this manner, you can make the report more readable for others.

The following sections will describe other aspects of report writing. Examples are indicated by italicized words.

Spelling

Spellcheckers are part of all word processors. In Word 97, this task is accomplished automatically, and misspelled words are indicated by a red curly underline. Your report should not contain obvious misspellings. However, spell checkers are not foolproof, and there are several instances where you need to be careful:

- Words that are spelled correctly but are misused. For example, if I wrote the phrase misspelled words are indicted by a red curly underline, the word indicted is not misspelled. However, I meant to use the word indicated.
- You spell checked, then had one last idea on how to improve the report. You typed that idea, and then printed the report. Always look for spelling errors (as well as other errors) just before printing.

Paragraphs

Paragraphs are meant to show an idea, and are usually comprised of several sentences. You should read the text, and determine if a new paragraph is needed. If you have a paragraph that is more than five sentences, you probably could create a new paragraph.

The first sentence in a paragraph should inform the reader about the information in the remaining part of the paragraph. The first paragraph in a section should do the same thing for that section. Always tell the reader what you are going to write, then describe that statement in detail.

Sentences

There is a fine line between sentences that are too long or too short. Very short sentences will make your report sound choppy. However, the more common mistake is for the writer to try to write a sentence that is too long. If a sentence is more than two lines, it is probably too long, and could be broken into two sentences. This method will make your report easier to read.

To illustrate that concept, you could have written the last thought as follows.

A common mistake is for the writer to try to write a sentence that is too long, and if a sentence is more than two lines, it is probably too long, and could be broken into two sentences, which is a method that will make your report easier to read.

Read sentences out loud – if you are out of breath when you come to end of the sentence, it is too long.

After you complete a spell check, there is a dialog box that displays various statistics for your document. One of the statistics is the Flesch Reading Ease score. This score rates text on a 100-point scale; the higher the score, the easier it is to understand the document. For most standard documents, aim for a score of approximately 60 to 70. This dialog box will also display how many sentences per paragraph, and the average length of each sentence.

Acronyms

There will be many times when you are writing a report and will include an acronym (NJIT, IEEE 488, USB). The first time you write this acronym in a report, spell out the acronym (what it means).

Active vs. Passive voice

If you use the grammar check in Word, you might see the phrase “sentence is in passive voice”. Passive voice should be avoided. An example of an active sentence is “The student passed the test”. The subject is the student, the verb is passed, and the test is the direct object. This sentence shows who is responsible for what.

However, many people would write this sentence as “The test was passed by the student”. By reversing the object and subject, and including a form of the verb to be (in this case the word was), you have created a passive voice (I guess to be totally incorrect I could say a passive voice was created by you). Try to proof read what you have written. At the end of the spell check, the dialog box with the readability statistics will show you what percentage of your document has passive voice.

Another example of active vs. passive voice is as follows (courtesy of Professor Marilyn A. Dyrud, OIT)

Passive voice (AVOID THIS):

Tests were developed for the written fundamentals section of the course by a doctoral student from the English Department. Four versions of each test were prepared for each class to discourage cheating. After the writing fundamentals objectives test were administered, an item analysis was prepared. Based on the results of the analysis, the tests were revised prior to the next testing class.

Active voice (CORRECTED):

A doctoral student from the English Department developed tests for the written fundamentals section of the course. To discourage cheating, she prepared four versions of each test for each class. After students took the test, she prepared an item analysis and then, based on the results of the analysis, revised the tests before the next scheduled exam.

Note that in the second section of the passive voice, there was not responsible placed on anyone for preparing the test. In the active voice, you know who prepared the test. This is one of the main reasons to use active voice.

Extra words

In many prior English classes, you were encouraged to demonstrate your knowledge of the language. Unfortunately, one method that many people choose is to put in unnecessary or extra words in sentences. Don't write at this point in time – replace that phrase with the word now. Don't use the word upon further reflection – eliminate it. Don't use the phrase in consideration of the follow – use because.

Examples of extra words (also contains passive voice) – **AVOID DOING THIS:**

Upon further reflection and analysis, it was decided that we need to pursue a different course of action, or perhaps a different methodology in the experiment. In consideration of the time remaining, and understanding the various problems that could beset us if we continued our present course, it was decided by both of us to eliminate one or more of the different sections of the experiment.

Alternative way of writing this sentence – **TRY DOING THIS:**

We didn't have enough time to complete the experiment, so we decided to eliminate some sections.

Repetition of words or phrases

The lab results were approximately 3 volts. This is approximately the result I expected. In performing the pre-lab, the results were 2.9 volts, which was approximately the same as the laboratory results.

Hopefully, you won't write this paragraph. The problem is that many people have words that they like to repeat (such as the word results in the preceding paragraph). That is fine if the word is not repeated too often, or if the repetition is not in the same or an adjacent paragraph. Use the thesaurus (or a dictionary) to come up with other words.

Gender neutral

If your lab partner is a male, then you can refer to your partner as he. However, if you are referring to a group of people (technical or not), do not use a gender term (such as he or her). For example, if you were writing a term report on career opportunity for engineering technologist in sales, you might write the following:

Over 5% of recent engineering technology graduates in the last five years became salesmen.

Try using the word salespeople, or use the phrase went into sales. Also, avoid using the term he/she too many times.

Conforming conclusion

In many lab reports, I have seen the phrase “the experiment conforms to theory”. This is what I call conforming conclusion, and there are several problems with this phrase:

- In some cases, the graphs do not appear to conform to theory. Therefore, how can you make that statement in the conclusion. You will **lose significant points** on your report if this occurs.
- What theory are you writing about. If you are making this statement, support it by showing what is the theory you are referring to, and give examples.

Units

Make sure that when you write numbers that have units associated with them, you have them correct. For example, writing about a resistor with 100 OHMS is not correct, nor is it correct to write 100 K Ω . Make sure you understand what letters are capitalized, and how to insert symbol fonts into your report. For EET, the easiest way to insert an ohm sign, Ω , is to type a capital w, highlight it, and then change it to a symbol font. However, make sure you change the font back to the original font after highlighting the W. Otherwise, you will be writing the rest of the report in Greek.

An alternative way of inserting the symbols is to use the AutoText feature in Word. Type the phrase Ω , k Ω , or M Ω , highlight it, and then by choosing Insert...AutoText you can give it a shortcut name (for example, I use ko for k Ω , mo for M Ω and o for Ω). You type in the shortcut name, press the F3 key, and the word or phrase you want will appear.

Charts, Graphs and other Objects

Charts, graphs and schematics can be created in a variety of applications, such as Excel, Mathcad, PSpice and PowerPoint. Instead of printing a separate page for each drawing, you should embed these objects in your Word document, at an appropriate point. Copy the object from the original application, and then paste them into Word. If you want to avoid having a frame around the object (which can cause problems when inserting this object at a particular line), then choose Paste special and uncheck the Float over text box. For the more advanced users, you can keep a frame around the object and word-wrap around the object.

You should always have a figure number (consecutive in your report) with a brief line below it describing what the figure, schematic or graph represents. Also, you should reference this figure number in the appropriate line of your report.