How to write a Report and Gain Stature and Structure

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1 Overview

Although engineering and science students are frequently required to write laboratory or project reports, there is little printed information available about how to write such reports. Furthermore, every discipline, every course, and every professor seems to require a different format and style, and different kinds of laboratory experiments are often reported in different ways. Hence, it is impossible for this handout to describe one right way to compose a report.

What this handout does describe is a generally applicable format for the project report for Digital Integrated Circuit design course, leaving you to adapt this format to your particular situation. That is, you can vary the format according to what is most appropriate for the work you are doing. More importantly, always check with your TA or instructor about the specific format he or she desires.

1.1 Title Page

The title page provides the name of the lab experiment, the names of the lab partners (if any), the date, and any other information your instructor or TA requires.

1.2 Abstract

The abstract is the report in miniature. It summarizes the whole report in one, concise paragraph of about 50-100 words. As distinguished from the introduction, the abstract tells the reader what will be done and lays the groundwork. Also, the abstract summarizes the report itself, not the actual experiment. Hence, you cannot write the abstract until after you have completed the report.

Before writing the abstract, it is often helpful to summarize each section of the report (introduction, methods and materials, procedure, results, discussion, and conclusion) in one sentence. Then try to arrange this information into a short paragraph. Remember, the abstract should be a precise and specific summary.

1.3 Introduction

The abstract summarizes the whole report, whereas, the introduction presents the subject of the report and acquaints the reader with the experiment. The introduction sets the entire mood of the report. Consequently, it is the most important part of the report as well as the hardest to get right.

Typically, the introduction states the problem to be solved or the experiment to be performed and explains its purpose and significance. It also provides previous research or methods to let the reader know why this experiment is important (or to solve the problem). Usually, putting the information verbatim from another document, such as a lab manual, is not recommended. Instead, you can simply make the appropriate references to the manual.

1.4 Background

This section is a full descriptive narrative including the basic theory behind what is trying to be accomplished in the laboratory. It is important to be complete, accurate, and precise and to give credit where credit is due. If any statement or equation is utilized or paraphrased, it **must** be referenced. Forgetting to reference prior material could get you in trouble with a plagiarizing accusation. State what you really did and why and what actually happened, not what was supposed to happen or what the textbook said. If something occurred or you learned something specific, you could state it here or in the next section.

1.5 Results

Again, give your actual results, not what should have happened. Although results are usually presented quantitatively, you should always introduce

each block of information verbally and provide clear and accurate verbal labels. You want to try to summarize everything with some key figures. For example, if you were completing a switch-level simulation, you want to make sure that you give a comprehensive review of the delay.

You must also explain, analyze, and interpret your results, being especially careful to explain any errors or problems. This is probably the single most important part of the report, since it is here that you demonstrate that you understand and can interpret what you have done.

1.6 Conclusion

Draw conclusions from the results and discussion that answer the question, "So what?" Then go on to explain your conclusions. In this section, you may also criticize the lab experiment and make recommendations for improvement. Such criticisms and recommendations, however, should focus on the lab as a learning experience; mere complaints about faulty equipment or amount of time spent are not appropriate.

1.7 References

Some reports require references at the end. Use the correct forms for the particular field you are working in. Always consult your field for finding the appropriate reference forms, and check a style manual for the field. Our field is usually stated by either the ACM and/or IEEE.

1.8 Appendices

Appendices should include raw data, calculations, graphs, and other quantitative materials that were part of the experiment, but not reported in any of the above sections. It is also a good idea to annotate your data that may come from simulation or equipment. Refer to each appendix at the appropriate point (or points) in your report. For example, at the end of your results section, you might have the note, See Appendix A: Raw Data Chart.

2 Rules for Writing

The role of writing is one of the most important things that I hope you get out my classes. If you can not communicate, you will not succeed in many things you try to accomplish. I find that every year I have many students who tell me that they hate reports with a passion. However, I can tell you that the only way to get better at writing is experience, experience, experience. Ernest Hemingway, one of America's most prolific and famous authors, always felt his English was terrible and that unless he practiced **every** day, his work would not be effective. I feel this applies to both you and me, as well.

I know it sounds silly, but when writing, I attempt to think of a cloned version of myself looking at me behind my monitor and telling me what I did. Then, I try to write down, as fast as I can, what I am telling myself about what I want to write about. I will go back many times to rephrase what I originally wrote to make it sound clearer and accurate. The following are pointers and rules that may additionally help you when writing your lab or project reports.

1. Try to be concise and succinct. Keep your information/writing short and simple, so as make it understandable by anybody. You do not have to use several words, when one will do. Make sure your sentences have a verb, nouns, and proper structure. Use tables, bullets and graphs effectively. Each of these should tell a thousand words.

2. Do not be afraid to start! I think this is one of the best tips I can give. Both you and I will have a **terrible** report during the first attempt; accept it, and move on. A good report takes a significant number of revisions (and, I mean more than two), so try to start writing the report at least one week before the report is due to allow for rewrites.

3. Try to be forceful with your vocabulary. This means the following:

   - Avoid vague language.
   - Use active voice.
   - Avoid clichés or catch phrases.
   - Avoid jargon like user-friendly.
   - Always elaborate on acronyms the first time, then you can use the acronym once you have established its meaning.
   - Do not use pronouns such as I or we. In general, reports should be written in the third person in an impersonal style. The entire report should be written in continuous prose: do not expect figures or equations to serve where sentences and paragraphs are needed.
   - As you edit your report, delete unnecessary words, rewrite unclear phrases and clean up grammatical errors. Use separate headings

for each section. Allow space between sections. Place tables, schematics, or graphs logically usually at the top or bottom, label and number them clearly, and execute them neatly. Aim for a clear, easy-to-read, professional-looking report.

4. Be correct - the fear of not being grammatically correct keeps many people away from writing. One should be aware of grammar for structure. The proper use of grammar gives the writer more authority. Special aspects ought to be considered, such as subject-verb agreement, correct use of pronouns, avoiding the misunderstanding between he/she, the effective use of parallel construction, and having the modifiers in the right place. Always use the facts to base your observations and use them to make your case or to justify your actions for simulating, creating, or designing. Theory is the backbone to **ALL** reports. You do not have to be a theorist, but you do have to be correct.

5. Be polished - This is the last phase of the process. After having been concise, forceful, and correct, it is time to be polished and use the adequate vocabulary to the audience. The writer needs to communicate with the audience at the audience's level. This involves reading what you have written a couple of times. Do not write something and then not read it. Print it out, and read it!!! I usually print out my documents multiple times and make corrections on paper. I find that I miss typos and other things by reading it on the computer screen. Finally, do not forget to use a spell-checking program.