

How to Write a Technical Paper (Formal Lab Report)

A Technical Paper is broken down into five major areas*. The first section is the introduction, followed by the materials and methods, results/discussion, conclusion, further experiments, and finally the bibliography. Below is an explanation of the various parts of the technical paper and what should be included in each. (*In a paper that is being published there is an additional section called the abstract which is written last and is a summary of the entire lab and placed before the introduction.)

Introduction:

The introduction is broken down into three areas, the “What”, “Why”, and “How”. All three areas should be addressed in the introduction. The “What” is background information on the topic of your lab report. You can get this information from your text, other books, or magazines that you might have. The “Why” is the purpose of your lab and can include your hypotheses. This section can be a few sentences in length. The “How” is a one to two sentence overview of the lab. In the introduction, parenthetical citations should be used. In your discussion of background information you should site all facts given. Example: The pH that enzymes generally function at is around 6.0 (Campbell 2002 pg 292) The page number is not always present. If not placed there it will definitely be in the bibliographic citation.

Materials/Methods:

This is a sequential explanation, in paragraph form, of how the lab was carried out. Include a diagram of the lab set up as needed. Label the diagram of the setup and refer to it in the procedure. Include the materials with the explanation and not in a separate category. This should be in a **narrative paragraph, not a list**.

Data/Results:

This is a sequential accounting of what happened in the lab. This is **not why it happened**. There should **always be a written narrative of the lab results**. As well as a written description of the events in the laboratory, other methods of displaying data should be used. Data tables are probably the best way to display the data. Each data table must be labeled with a title and include proper units. Use a ruler to draw your data table if drawn by hand. The use of a computer is valuable and highly recommended. Graphs are very important. They allow for rapid interpretation of data and should be used if possible. Axes of the graph should be labeled, and the graph should have a title. Plate drawings could also be part of your results if appropriate. **The correct labels (ie Table A: Time vs. Protein Concentration) should be given to all tables and figures. Each should have a label and caption.**

Conclusions:

In the conclusion, the purpose should be discussed and analyzed as compared to the results obtained in the lab. Using the data, explain how the data supported or did not support the hypotheses explored. Explain what the results show, using the data to support individual conclusions. In summarizing, one must consider any sources of error that may have occurred in the experiment and then how one could eliminate them next time. What can be concluded from the experiment and what can be related to other more general concepts?

Further Experiments:

This section can be included in the conclusion or separated into a new section and discussed further. What new directions could be taken in answering the research question being explored?

Bibliography:

Campbell, Neil *Biology* 5th Ed. Benjamin Cummings 1997

Writing The Paper:

If possible, the report should be typed, preferably on a computer so corrections can be made and reports can be saved on a disk for future use. If one doesn't have a computer there are computers on campus to type the report. If handwritten, the paper should be written on one side only, in blue or black ink.

If reference sources are used or some other data that one did not generate personally the sources should be cited in the body of the laboratory(introduction usually) and in the bibliography at the end of the report.* Don't let the report be governed by a specific resource book or be confined to others words/quotes. Too often student reports sound like the text or other resources. Technical writing is to communicate one's findings and give insight into the subject that is being explored.

Each lab must be double-spaced, with 12-point font that is easy to read. Margins should be 1.25". Each section of the report should have its respective heading underlined and followed by a colon (:) with a font that is 14 to 18 point, as shown in these instructions. Don't leave large spaces between each section of the report. However, do separate each section by at least one space. Provide a cover sheet for your lab. Staple all papers together neatly. Don't include a cover or binder.

In writing the lab, the proper voice and tense should be followed. The proper voice should be third person in the past tense. An example from a lab instruction: "Add 150 mL of HCl to a beaker" would become "A beaker was obtained and 150 mL of HCl was added."

Much of science involves working together on experiments and therefore team members collect the same experimental data. A report is expected from each person and each person may interpret the same set of data differently. As long as data are used to back up the findings, the interpretations can be equally acceptable. Plagiarism is a real problem and the need to cite all references in the body of work and at the end is important. Information should be cited in the body of the report right after the use of the information.

*Example: The distance from one point to the other is 22.5 feet (Schmoe 1998)

Sometimes diagrams are a necessary part of your explanation. Remember to explain any diagram that is included. Without an explanation diagrams are worthless. **Any diagram or item other than text should be referred to in the body of the report. The correct labels (ie Table A: Time vs Protein Concentration) should be given to all tables and figures. Each should have a label and caption. Graphs should also include a title.**