

SCIENCE LAB REPORTS

Formatting is one of the most important things to consider when writing a scientific lab report. Reports often have very strict requirements that include prescriptions for style, length, and content. This usually means that being concise is the primary goal of writing for the sciences. It is worth noting that the lab report requirements will vary from course to course, and that the best resource to consult is the class custom courseware.

An effective, well written lab report doesn't just follow formatting requirements and present data; it demonstrates an understanding of the principles behind the data. Students are required to identify how and why differences between their expected and observed results occurred.

LAB REPORT FORMAT

Abstract

The purpose of the abstract is to summarize the major findings of the report. Generally speaking, it will contain one or two sentences for each section of the lab report, forming a paragraph that is between 100 and 200 words. The writer should begin with a brief, but specific, background statement that will introduce the report. They should then state the main purpose and hypothesis of the experiment. Afterwards, the important points of the methodology should be covered. This can include the techniques or instruments used to make measurements, the number of samples used, and the species or reagents being studied. The key findings should be summarized quantitatively and qualitatively. The major points from the discussion section should then be included. These should relate to the hypothesis, or question, of the experiment. Each summary should be written in the same tense as the section it describes.

Introduction

The Introduction section should identify the area of interest, providing background information that will help the reader understand the experiment. This section of the report should be written in the present tense when describing theory, permanent equipment, or the report; past tense and present perfect are acceptable when describing the results of previous studies. The experiment itself should be referred to in the past tense. The background information is usually a short literature review of several related experiments that addressed a similar problem. It can include information from a course textbook, lecture notes, or similar experiments whose results support the hypothesis. The writer should also explain how their experiment will help to expand the area of knowledge described in the literature review. The last sentence of the Introduction section should be the statement of purpose, in which the author specifically states the question the experiment was designed to answer. There are several ways to accomplish this.

Purpose statement: *The purpose of this investigation was to determine the effects of mobilized arsenic*

exposure on reproduction patterns of migratory fish species in Southern Ontario.

Hypothesis: *The hypothesis was that exposure of mobilized arsenic would affect the reproductive patterns of migratory fish species in Southern Ontario.*

Null hypothesis: *The null hypothesis was that exposure of mobilized arsenic would not affect the reproductive patterns of migratory fish species in Southern Ontario.*

Methods and Materials

The purpose of this section is to describe what was done in the course of the experiment and how it was accomplished. This section should be written in the past tense, with complete sentences. It is common practice to use the passive voice when describing what was done. This section should provide enough information to allow the reader to duplicate the experiment exactly as it was performed; it will usually include the experimental design, a description of the apparatus used, the methods for gathering and interpreting the results, and the different kinds of controls present. Many undergraduate-level reports do not require a complete summary of materials and methods because this information is often provided in the custom courseware for the class. In this case, the source of the methods used in the experiment should be properly referenced. Special attention should be drawn to any procedural steps that were altered from the source material.

Results

The Results section should present the data and observations from the experiment without interpreting their meaning or significance. This section should be written in the past tense. It is meant to deliver the findings of the experiment and create a framework for the Discussion section. The information is usually presented in the order that it was observed according to the procedure, and it should be supplemented with tables (raw data) and graphs (interpreted data) when necessary. If calculations were used to create a graph, a sample calculation should be included, with the remainder in the Appendix at the end of the report. Raw data also belongs in the Appendix section. The author should also include the results that deviated from their expectations, although they shouldn't try to explain how or why they went wrong until the Discussion section.

Discussion

The purpose of the Discussion section is to analyze and interpret the results and how they relate to the previous studies on the subject. This section should be written in the past tense when describing the experiment and present tense when comparing the findings to current theory. There should be enough information to let the reader understand why each result occurred; the author should try to avoid

repeating too many details from the Results section. When information is repeated from that section it must be accompanied by an interpretation or explanation of the cause of the observed phenomenon. The author must identify the patterns and relationships within the data, stating why they observed what they did, how the results differed from what was expected, and how they relate to theory and the original purpose of the experiment. The section should compare this information with the literature described in the Introduction section, supporting these comparisons with referenced information. As mentioned earlier, the Discussion section should follow the same order as the Results section.

The author must also accept, or reject, their hypothesis statement, explaining why. Rejecting the hypothesis is acceptable as long as the author can demonstrate that it isn't valid and explain why the results were not what was expected. If something went wrong with the procedure or the equipment the author must explain how the results were affected. Many laboratory manuals also contain questions to be answered at the end of the report. These answers should not be included in the Discussion section as separate points, but as a flowing discussion that goes beyond what was specifically asked in the assignment.

This section will also contain the conclusion of the report. This should entail a short restatement of the purpose and main results of the experiment, along with their relevance. Future suggestions for possible areas of study and possible suggestions for changes to the procedure may also be included.

Tables and Figures

Tables and figures can be used to convey large amounts of information in a small amount of space. Any items that are not considered a table should be referred to as a figure. Each should have a title that explains the content of the image adequately; the reader should not have to look at the image itself to know what information it contains. These labels go above tables and below figures. Tables and figures should be numbered according to the order that they appear in the report. The numbers are assigned independently for each section, so the first table will be referred to as "Table 1" and the first figure will be referred to as "Figure 1", even if it comes after Table 1.

Every table and figure must be specifically mentioned in the text of the report with a comment that identifies the relevant information without completely restating it. For example, a trend may be identified, but the specific data points that it is composed of do not need to be included. Avoid referring to the tables and figures spatially, with comments such as "the above table", because their final location may change before the report is completed. Anything of relevance must be mentioned in the text; this means that the reader should be able to understand the entire report without the figures and tables, which are there to enhance the report.

Appendices

These usually include raw data, calculations, tables, and figures that were not used in the body of the report. Each class of item should have its own Appendix, and each of the Appendices must be referred to at least once in the report.

References and In-Text Citations

This section is composed of a list of the papers and resources that are mentioned in the report. It goes at the end of the report, on its own page. The specific manner this section should be written in will vary depending on the referencing style that is used. The lab manual or courseware should identify a preferred referencing style that can be followed. Citations can be made two different ways. The first is to include the author's name and year of publication in brackets after the statement. The second is to mention the author's name in the body of the text and provide the year of publication in brackets immediately afterwards.

RESOURCES:

University of Toronto (n.d.). The Lab Report. Retrieved from: <http://www.writing.utoronto.ca/advice/specific-types-of-writing/lab-report>

Carleton University (2013). Writing a Lab Report. Retrieved from: <http://sssc.carleton.ca/student-resources/writing-lab-report>

University of Guelph (2004). Writing Lab Reports or Research Reports. Retrieved from:
http://www.lib.uoguelph.ca/assistance/writing_services/resources/handouts.cfm