



Parts of a Lab Report

A lab report is a formal document that presents the findings and analysis of an experiment or scientific investigation.

Basic Guidelines

- Lab reports should be written in past tense.
- Passive voice is traditionally used in scientific writings, with few exceptions that tend to be section-specific rather than subject- or discipline-specific. However, recently the use of active voice is becoming more accepted. Check with your professor about whether they prefer passive or active voice prior to writing your report.
- Sentences should never start with a number or unit.
- All figures and tables require a title and a caption that details its contents and relevance. In addition, each figure and table must be directly mentioned at least once in your paper.
- Lab reports likely contain all of the following key elements: Abstract, introduction, methods and materials, results, discussion, conclusion, and references.
- Third person point of view is traditionally preferred. However, like voice, current trends allow for more use of first person in lab reports, especially in the discussion portion of the paper. Consult your professor about if they will allow first person before you begin writing your paper.

Key Elements

Abstract: An abstract is a brief summary of the report. This summarization provides an overview of the experiment's purpose, methods used, key results, and major conclusions. Any acronyms or jargon should be defined in the abstract. It ranges in length but is usually 100-250 words long.



Introduction: The introduction provides any necessary background information on the topic and components of the experiment, such as a review of past research or the context for the research. The report's hypothesis and/or research questions are stated towards the end of this section.

Speaking and Writing Center [1]: Be wary of going into too much highly specialized data here, as you want to keep your introduction concise and understandable.

Hypothesis: Your hypothesis is a statement of what you believe the outcome of the experiment will be. Model your research hypothesis in a way where you state what you believe based on the independent and dependent variables of your experiment.

Speaking and Writing Center [2]: Some science classes preach "if... then... because..." hypotheses but you are not required to state those exact words. If you are stuck crafting a hypothesis, consider using that format to brainstorm!

Methods and Materials: This section lists all materials, methods, and equipment used to conduct the experiment. The procedure is explained step by step so that the experiment can be repeated in the future. Any variables, controls, and measurements can be found in this section.

Results: The results section presents data collected during the experiment or research period. Graphics that present or complement any quantitative data are often in the form of a table, plot, or graph; they have titles and captions. All data (i.e., quantitative and qualitative) is reported accurately regardless of whether it proves or disproves the hypothesis or research questions. The outcome of any relevant statistical test is given here.

Discussion: The results of the experiment are analyzed in this section. Any research questions that were posed in the introduction are addressed. The results of any statistical analyses are interpreted to either accept or reject the hypothesis. Any errors, limitations, or unexpected outcomes are discussed. The findings are then compared to, contrasted with, or otherwise contextualized by prior research and/or scientific theories. The discussion is often combined with the conclusion section, but not always.

Conclusion: The conclusion summarizes the findings of the experiment. It reiterates whether the hypothesis was supported or disproven. It often provides insights into the broader implications of findings, including suggesting the need for retrials, further research, or improvements to methods.

References: All sources are cited as full citations here. The citation style that is wanted can vary. Check with your professor about which style you should use.



Sample Lab Report

The Effect of Going to the SWC on Grades

Abstract

The Speaking and Writing Center (SWC) helps students improve on written work and presentations for their classes. Many students have claimed that they perform better on assignments when they visit the SWC at some stage in the process of writing a paper or preparing a presentation. This study aimed to quantify the difference in grades that students receive when utilizing the SWC versus without utilizing the SWC for the assignment. Out of a class of 50 students, 25 were asked to go to the SWC, while 25 were instructed to complete all assignments without help from the SWC. The students who scheduled and attended SWC appointments received an average of 14.48% higher points out of 100 on assignments than those who did not make and attend appointments. This data aligned with both the student accounts and the experimental hypothesis, suggesting that SWC appointments do have an impact on student grades.

Introduction

Speaking and Writing Center (SWC) consultants have often heard from students who previously visited the SWC about how well they did on their assignments thanks to the help from the consultant. To test this, quantitative data was collected on how going to the SWC for assignments affects student performance in speaking and writing assignments.

The role of a SWC is to hold synchronous appointments between a consultant and student to work on a student's paper/presentation and discuss points of improvement (North, 1984). While the short-term goal was to improve the students' assignments and raise their grades, it serves the greater long-term goal of improving students' speaking and writing skills so that they become self-sufficient in these skills as they will not have ready access to professors or a SWC after college (Archer, 2008).

Going to the SWC improves students' writing and presenting/speaking abilities. As such, we expect that if some students are required to go to the SWC for their class and some are prevented from doing so, the students who attend SWC appointments will perform better on their assignments.

Methods

Participants

A section of a Writing Intensive (WI) designated class with 50 students was separated into two groups of 25. Each group was given the same assignment with the same grading criteria. Participants' demographic information was not collected. The assignment was due on the same day and time for each group and each group received equal time to complete it. One group was required to go to the SWC for all of their assignments (SWC+), and the other group was prevented from going to the SWC and seeking additional outside help (SWC-).

Speaking and Writing Center [3]: In this example we model an APA lab report. APA reports should be double spaced and in Times New Roman. Our sample report is not double spaced in the interest of saving trees.

Speaking and Writing Center [4]: Abstracts are generally 150-250 words unless otherwise instructed. This one is 151 words.

Speaking and Writing Center [5]: Here is an example of defining an acronym in your abstract. If you do not define acronyms or unknown terms, your reader may be confused. Notice that the full name comes before the acronym and that the first time it appears, the acronym is in parentheses.

Speaking and Writing Center [6]: Background

Speaking and Writing Center [7]: Purpose

Speaking and Writing Center [8]: Methods

Speaking and Writing Center [9]: Results

Speaking and Writing Center [10]: Discussion and Conclusion

Speaking and Writing Center [11]: Note, in APA style, or many other styles, you would not title your introduction. We have labeled it so that you know what part of the report we're annotating.

Speaking and Writing Center [12]: Background information to help the reader understand why you did this research. Notice that here we have repeated defining the acronym; we did this because this is the beginning of the actual paper. From here on out, you can use just the acronym.

Speaking and Writing Center [13]: Passive voice is often used in lab reports to avoid personal pronouns, "we, me, I..."

Speaking and Writing Center [14]: The point that you wanted to research- this is distinct from a hypothesis, which is a direct claim that comes later on in the introduction.

Speaking and Writing Center [15]: Background to support hypothesis.

Speaking and Writing Center [16]: Hypothesis

Speaking and Writing Center [17]: Depending on the study, demographic information (age, gender, race, etc.) may or may not be collected. If it is collected, you should specify what information was collected and how it is being used.



Materials and Procedures

When the assignment was due, every student was required to turn in the assignment regardless of completion status. The submissions were then assessed by a reader who was unaware of what group each student was in. The grades were shared with researchers, identified only by which group the student who completed it was in. The grades were then sorted by group (SWC+ or SWC-) and analyzed.

Results

The mean score of each group was calculated. Table 1 shows students who went to the SWC were found to have a mean grade percentage of 84.28% and a standard deviation of 6.98. Students prevented from going to the SWC got a mean grade percentage of 69.8% and a standard deviation of 9.34. A Chi-Square test was conducted to derive a P value. The P value was about 0.039. This P value was compared to an Alpha value of 0.05.

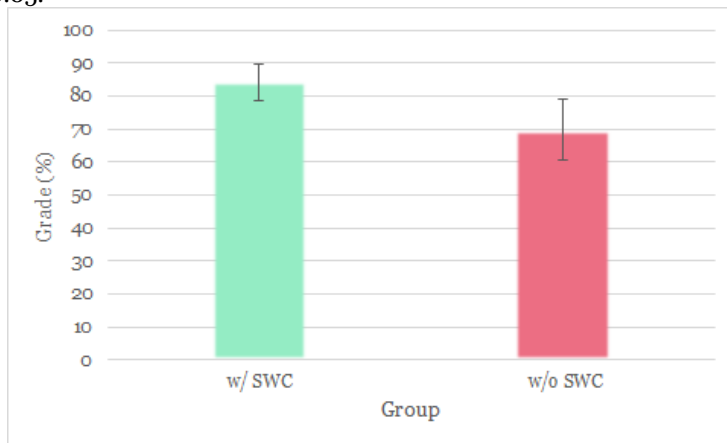


Figure 1: The Relationship Between Using the SWC and Grade Percentage.

The following graph was created by Speaking and Writing Center consultants for demonstration purposes; the data is fictional.

Speaking and Writing Center [18]: Materials and Procedures is part of the methods section. It may or may not have its own heading depending on what style you are writing in.

Speaking and Writing Center [19]: All lab reports, whether humanities, social science, or physical science based, contain results section. The exact formatting may vary from discipline to discipline. In some disciplines the results and discussion may be combined as one section; in others, the sections are separate, so be sure to check what is wanted of your project.

Speaking and Writing Center [20]: A mean score is the calculated average of all the scores reported. For example, the mean of the numbers, 17, 29, and 44 is 30 (Math equation: $(17+29+44)/3 = 30$).

Speaking and Writing Center [21]: In APA your graphs and figures are called "Tables". If your work will be published, it will appear in an appendix after the references section. If not, it is okay to put tables in your results section.

Speaking and Writing Center [22]: This is an example of how to reference a figure or graph in the text. This could also be done parenthetically: Students who went to the SWC were found to have a mean grade percentage of 82.28% and a standard deviation of 6.98 (see Table 1).

Speaking and Writing Center [23]: The standard deviation is here represented by the vertical bars at the top of each column-- this indicates the range of the highest and lowest scores in each category.

Speaking and Writing Center [24]: The null hypothesis states that there is no grade difference in students who visit the SWC versus those who do not. The research hypothesis states that there is a difference between those two samples. In statistics, researchers can 'reject' the null hypothesis and they use p values to do so. A p-value, or probability value, is a number that tells you how likely it is that your data could have occurred by chance. It can be used to reject a null hypothesis-- or a hypothesis which says there will be no change. P values are normally set at the 0.05 value, so if the null hypothesis is true there is only a 5% chance of getting a score lower than 0.05. If the data shows a p value less than 0.05, we will reject the null hypothesis meaning that there is a difference between the samples.

Speaking and Writing Center [25]: This p value is lower than 0.05 so we can reject the null hypothesis! This means that visiting the SWC did affect grades!



Discussion

The data shows that the hypothesis was correct: students who visit the SWC have higher grades than those who do not visit the SWC. These findings support existing research that also found that students who visit a similar center score higher grades. The researchers did not ask for demographic information such as major, grade level, and type of student (commuter or on-campus) which may change results. Future research should be conducted alongside demographic information to see if results are generalizable to the student population. These findings show that Speaking and Writing centers are important for colleges to have because they do help students' grades.

Conclusion

Going to the SWC is found to have significantly increased students' grades within the course. We can reject the null hypothesis that going to the SWC does not improve students' writing and presenting/speaking skills. Further, the research conducted shows that we can accept the hypothesis that going to the SWC does aid in improving students' writing and presenting/speaking abilities.

Future research could investigate whether the point in the writing process that the student comes to the SWC has any impact on the grades they receive. Any further research may also need to consider the influence that the teacher may have on the grades, as different teachers hold students to different standards, which may be reflected in the grades they give.

References

- Archer, A. (2008). Investigating the effect of Writing Centre interventions on student writing. *South African Journal of Higher Education*, 22(2), 248–264.
<https://doi.org/10.4314/sajhe.v22i2.25784>
- North, S. M. (1984). The Idea of a Writing Center. *College English*, 46(5), 433–446.
<https://doi.org/10.2307/377047>
- Salazar, J. J. (2021). The Meaningful and Significant Impact of Writing Center Visits on College Writing Performance. *The Writing Center Journal*, 39(1/2), 55–96.
<https://doi.org/10.7771/2832-9414.1958>

Speaking and Writing Center [26]: Relate back to your hypothesis - do your findings agree or contradict with your hypothesis?

Speaking and Writing Center [27]: Connect your findings to existing literature. Did you find more evidence for an existing theory? Do your results contradict a theory?

Speaking and Writing Center [28]: Discuss any issues there may have been with your research. What factors did you not include in your study? It's okay if there are some design mistakes or factors which weren't considered; these can help future researchers build upon or extend your study!

Speaking and Writing Center [29]: Propose future research, where should the next scientist pick up? What should they do differently?

Speaking and Writing Center [30]: Collecting demographic information might make it clear that this study applies to all of the students at UMW. Or, it might help to tease out if there is a population of students who most benefit from using the SWC (though, we always say anyone can benefit from our services!).

Speaking and Writing Center [31]: Take a stance here! Tell us why your work is important. Why should we care?

Speaking and Writing Center [32]: It is important to state for the reader the overall findings of the experiment conducted. This statement should answer the original research question that the experiment was trying to answer.

Speaking and Writing Center [33]: After stating the conclusion of the experiment, it is important to clarify which hypothesis is accepted based on the results. In this case, the null hypothesis is rejected, and the alternative hypothesis is accepted.

Speaking and Writing Center [34]: After addressing the final consensus of the experiment, it is important to inform the reader of the next steps researchers should take.

Speaking and Writing Center [35]: When advising researchers of where they could take this research further, it is important to highlight to the reader any factors that you didn't consider when conducting your own research.

Speaking and Writing Center [36]: This is where any sources used (prior research papers, textbooks, journal articles, etc.) are cited. Preferred citation styles differ from discipline to discipline. Here, our citations are in APA.