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The two lab reports that I will be analyzing are Experiment #1: Thevenin Equivalence from the University of North Carolina at Charlotte and Experiment 2: Ohm's Law from Universiti Teknologi MARA. According to Markel and Selber in Technical Communication, an effective lab report follows several essential elements: title, abstract, introduction, materials and methods, results, discussion, conclusion, acknowledgments, and references. These sections allow researchers to present scientific findings in a clear and organized way so that others can understand and potentially replicate the experiment. While both reports communicate their experimental findings successfully, they differ in structure, level of detail, and how closely they follow the professional format described in Chapter 19.

An effective title should clearly communicate the focus of the experiment while being specific enough for readers to quickly understand what the research is about. The Thevenin report uses the title "Experiment #1: Thevenin Equivalence." This title is straightforward and clearly signals that the experiment focuses on Thevenin's theorem in circuit analysis. However, it does not specify the exact goal of the experiment, such as verifying voltage and current relationships or examining maximum power transfer.

The second report uses the title "Experiment 2: Ohm's Law." Like the first report, this title is clear but somewhat general. While it identifies the topic of the experiment, it does not mention that the experiment also explores resistance and wire length relationships. Both titles are appropriate for undergraduate lab reports, but a more descriptive title could help readers better understand the specific focus of each experiment.

The abstract serves as a brief overview of the entire report, summarizing the purpose, methods, results, and conclusions of the experiment. In the Ohm's Law report, the abstract clearly explains that the experiment was conducted to verify Ohm's Law and determine resistivity. It also briefly describes the use of voltmeters and ammeters and summarizes the finding that voltage and current share a linear relationship. This abstract effectively gives readers a quick understanding of the experiment before reading the full report.

In contrast, the Thevenin report does not include an abstract. Instead, it begins directly with objectives and background theory. While this format may be acceptable for some course assignments, it does not fully follow the structure described in Chapter 19. The absence of an abstract means readers do not immediately receive a concise summary of the experiment's purpose and results.

The introduction provides background information and explains the purpose of the experiment. It also establishes the importance of the research and connects it to existing knowledge in the field.

The Thevenin report includes sections labeled "Objectives" and "Relevant Theory/Background Information." These sections explain the concept of Thevenin equivalence and outline how open-circuit voltage and short-circuit current are used to determine equivalent resistance. The explanation is technically clear, but it assumes that readers already have some knowledge of circuit theory.

The Ohm's Law report includes a longer introduction that explains fundamental concepts such as voltage, current, and resistance. It also describes ohmic materials and introduces the equation $I = V/R$. This introduction provides more conceptual explanation and is easier for readers who may be less familiar with electrical theory. The difference between the two

introductions likely reflects the different academic levels of the courses for which the reports were written.

The materials and methods section explains how the experiment was conducted so that others could replicate the procedure. The Thevenin report provides an equipment list that includes a power supply, multimeter, and breadboard. It then describes measuring voltage and current in both the bridge circuit and the Thevenin equivalent circuit. While the explanation is clear, it is relatively concise and assumes familiarity with electrical circuit setups.

The Ohm's Law report includes a detailed methodology section describing how wires were connected, how the rheostat values were adjusted, and how measurements were recorded. The procedure is explained step by step and even includes a photo of the experimental setup. This level of detail aligns strongly with the expectation that scientific experiments should be reproducible.

The results section presents the data collected during the experiment without interpreting it. Both reports present their data effectively.

The Thevenin report includes several tables comparing measured and calculated voltage and current values. It also includes percent error calculations and graphs showing relationships such as voltage versus current and power versus resistance. These visuals help clearly present the data collected during the experiment.

The Ohm's Law report also includes tables of current and voltage measurements for different wire lengths. It then presents graphs used to determine resistance values and calculate gradients. Although the graphs appear less polished than those in the Thevenin report, the data is still clearly organized and easy to follow.

The discussion section interprets the results and explains how they relate to the theoretical concepts behind the experiment. In the Thevenin report, the discussion confirms that the bridge network and its Thevenin equivalent produced similar voltage-current relationships. The report also explains the concept of maximum power transfer when the load resistance equals the Thevenin resistance.

The Ohm's Law report focuses on explaining why resistance increases when wire length increases. The authors connect this observation to the formula relating resistance to resistivity and length. Both discussions successfully connect experimental results to theoretical principles, though the Thevenin report emphasizes engineering applications while the Ohm's Law report focuses more on basic physical relationships.

The conclusion summarizes the overall findings of the experiment and restates whether the original objective was achieved. The Thevenin report concludes that a complex resistive network can be replaced by an equivalent circuit consisting of a voltage source and resistance. The experiment successfully verified the accuracy of Thevenin's theorem and demonstrated the conditions for maximum power transfer.

The Ohm's Law report concludes that the experiment confirmed Ohm's Law by demonstrating a linear relationship between current and voltage. It also explains that increasing the length of the wire increases its resistance. Both conclusions effectively summarize the main findings of their experiments, though they mainly restate results rather than discussing broader implications.

Acknowledgments recognize individuals or organizations that assisted with the research. Interestingly, neither report includes a formal acknowledgments section. This suggests that

undergraduate laboratory assignments sometimes omit this element even though it is recommended in professional scientific writing.

The references section lists sources used in the report. The Thevenin report includes one engineering textbook used as a reference for the theoretical background. The Ohm's Law report includes multiple references, including a physics textbook and online resources related to Ohm's Law. While the Ohm's Law report provides more sources, some of the references are web links rather than traditional academic sources. The Thevenin report, although shorter, uses a formal textbook citation.

Overall, both lab reports successfully communicate their experimental findings and demonstrate many of the structural elements described in Chapter 19. The Ohm's Law report follows the textbook structure more closely by including an abstract and a detailed methodology section. The Thevenin report, however, presents data in a more polished engineering format with clearer graphs and error analysis. These differences likely reflect the academic level of the courses and the expectations of the instructors. While neither report perfectly follows the full professional structure outlined in the textbook, both demonstrate how lab reports can effectively present scientific findings depending on context and audience.

References

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