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PHYSICS PRACTICALS REPORTS WRITING AT ADVANCED SCHOOL LEVEL: AN INVESTIGATION INTO COMMON MISTAKES MADE BY STUDENTS IN HIGH SCHOOLS IN HARARE

BY

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DECLARATION

I, Jombe Synthiate Vimbai hereby declare that, except for references to other people's work which have been duly acknowledged, this dissertation is the result of my own research and has neither in part nor in whole been presented in Education programme.

Signed:  Date: 05.12.24

(Student)

This research work was undertaken under the supervision of Dr. Mudzamiri P.

Signed:  Date: 05.12.24

DEDICATION

This work is dedicated to my beloved mother, whose unwavering love, guidance, and strength have been my greatest source of inspiration and support throughout this journey.

To my dear husband, whose encouragement, patience, and understanding have been my constant motivation, and to my wonderful children Tinashe, Tichinashe and Tinayeishe whose smiles and love have filled my life with purpose and joy.

Your belief in me has been the foundation upon which this achievement rests. Thank you for being my pillars of strength.

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ABSTRACT

This study investigates the common mistakes made by Advanced Level Physics students when writing practical reports, focusing on high schools in Harare. Practical report writing is a critical skill in physics education, yet many students struggle to produce accurate, coherent, and scientifically rigorous reports. The study explores the nature and frequency of these mistakes, the underlying causes, and the relationship between student performance, teaching experience, and prior academic achievement.

A mixed-methods approach was employed, utilizing questionnaires for students and teachers, direct observation of practical sessions, and analysis of student reports. The findings revealed prevalent mistakes in data presentation, graph plotting, experimental design, and analysis, often linked to insufficient guidance, limited laboratory experience, and foundational knowledge gaps. Furthermore, correlations were observed between teaching experience and student performance, as well as between students' O-Level grades and their ability to write practical reports effectively.

The study concludes with recommendations for addressing these challenges, including enhanced teacher training, increased practice opportunities, and the integration of structured feedback mechanisms. The findings contribute to the ongoing discourse on improving practical science education and offer actionable strategies for stakeholders in Zimbabwean schools and beyond

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CHAPTER 1

1.0 INTRODUCTION

Practical work is an important component in the teaching and learning of all the science subjects in Zimbabwe. Practicals are done in the teaching and learning processes in order to improve students' comprehension of scientific concepts, develop critical skills for future employment, and get them ready for post-secondary education. Among the important practical skills that learners are expected to acquire is effective practical report which is generally the focus of this research study. This chapter focuses on providing the foundational framework for the study. It introduces the background to the research, highlighting the importance of practical report writing in advanced level physics and the challenges students face in this area. The chapter outlines the problem statement, which identifies the gaps and recurring issues in practical report writing among students in high schools in Harare. It also presents the objectives of the study, the research questions, and the significance of the research, emphasizing its contribution to improving teaching practices and student outcomes. Finally, the scope of the study is defined, and key terms are operationally defined to ensure clarity and focus throughout the research.

1.1 BACKGROUND

In order to improve students' scientific literacy and problem-solving abilities, practical practice is prioritized in physics education in Zimbabwe (Mutseekwa, 2021). For A-level physics students, being able to write excellent practical reports is essential because it allows them to explain scientific results, analyze data, and show that they grasp difficult topics (Stadermann et al., 2019). But according to research, students frequently find this work difficult, which lowers the caliber of their reports and ultimately affects their academic success. As part of their evaluation, A-level physics students in Zimbabwe must finish practical experiments and turn in written reports. The capital city of Zimbabwe, Harare, is home to a large number of secondary schools that teaches physics at the A-level. Students at high schools in Harare are not able to write acceptable practical reports, despite their value in their assessment (Mutseekwa, 2021).

Research indicates that A-level physics students in Zimbabwe face difficulties while producing reports because of a lack of laboratory skills, inadequate grasp of scientific principles, and inadequate direction (Mutseekwa, 2021). This is demonstrated by the low passing rates on A-level physics exams, where practical reports account for a sizable portion of the final mark. Concerns regarding the papers' quality have been voiced by educators and teachers, who point out their lack of organization, clarity, and scientific rigor (Ming & Goldenberg, 2021). The mistakes made by A-level physics students while preparing practical reports could have a lasting impact on their academic and professional careers if they are not addressed (Van De Heyde & Siebrits, 2022). The lack of good report writers could impede Zimbabwe's efforts to advance its STEM education and impede scientific research and innovation in the nation (Garwe, 2021). Scholars have emphasized the value of practical report writing in the growth of critical thinking and scientific literacy (Kennedy & Gruber, 2020). On the other hand, some educators contend that the focus on report writing detracts from science education's practical components (Felder & Brent, 2024). There has been a recent movement in education toward competency-based learning, with some arguing that report writing should receive more attention as a crucial ability (Açıkgöz & Babadoğan, 2021). Teachers in Harare have voiced worries about the dearth of tools and assistance available to them in order to successfully teach report writing abilities. Conversely, students report feeling unconfident and lacking comprehension when writing scientific reports. Parents and legislators stress the need for better STEM education and stress how crucial practical report writing is to reaching this objective. Research explicitly examining the mistakes committed by A-level physics students in Harare high schools when completing practical reports is scarce, despite the concerns expressed. With the purpose of filling in this information gap, this study offers insights into typical mistakes, underlying causes, and viable fixes. Despite its significance, little research has been done on the precise mistakes made by A-level physics students when composing practical reports, especially when it comes to Harare high schools. By investigating the mistakes made by A-level physics students in Harare high schools, this study seeks to close this knowledge gap. The study looks for typical mistakes, examines the underlying reasons, and investigates methods to help students become more proficient science/practical report writers in the real world. The results of this study will improve student learning outcomes, add to the body of knowledge already available on science education, and guide teaching strategies.

1.2 PURPOSE OF THE STUDY

The purpose of this study is to look into the typical mistakes that high school students in Harare who are doing A-level physics make when submitting practical reports. The research holds significance for multiple reasons:

1. **Improving Student Performance**: By recognizing the difficulties students encounter when composing useful reports, specific interventions can be made to help them reach their goals and improve their performance (Taye & Mengesha, 2024).
2. **Improving Teacher Practice**: Teachers can learn where they need to give more support and direction by pinpointing the precise mistakes that students make (Pollock & Tolone, 2020). Better student outcomes and more efficient teaching techniques may result from this.
3. **Contributing to the Literature**: This study, especially in the context of Zimbabwe, can add to the body of knowledge already available on practical report writing in physics education. The results can guide this field's future research and policy development.

Previous studies have emphasized a number of difficulties students encounter when composing practical reports, such as:

• **Insufficient comprehension of scientific concepts:** Students may find it difficult to relate their understanding of scientific principles to real-world problems (Smith et al., 2022).

• **Inadequate laboratory abilities**: According to Willingham (2021) students may not have the skills needed to run experiments correctly and get trustworthy results.

• **Inadequate instruction**: Students may struggle to comprehend the criteria and develop their writing skills if they do not receive enough guidance and criticism from their teachers (Vaughn et al., 2022).

1.3 STATEMENT OF THE PROBLEM

In recent years, a significant number of high school students in Harare who are pursuing A-level physics are struggling to produce meaningful and scientifically accurate practical reports. Practical reports are essential in evaluating students' understanding of experimental physics, as they allow students to demonstrate their ability to conduct experiments, analyze data, and draw conclusions based on their findings. The challenges encompass various stages of report preparation, ranging from basic aspects such as coining appropriate and scientifically relevant titles to more complex tasks such as presenting experimental readings accurately, organizing data into tables, plotting and interpreting graphs, conducting thorough analysis, and providing insightful comments. These stages of report writing are critical for demonstrating a student's understanding of the experiment and their ability to connect theoretical knowledge with practical work. However, many students often have difficulty formulating titles that accurately reflect the purpose and scope of the experiment. This issue stems from a lack of understanding of the experimental objectives and poor articulation of scientific goals. Students also find difficulties in presenting their reading accurately and in a systematic manner. Students sometimes omit essential readings, misinterpret data, or present them in a disorganized way. While tables are a common tool for organizing and displaying data, many students fail to structure them correctly, leading to confusion and misrepresentation of results. Students often fail to connect their experimental findings to the broader physics concepts, resulting in weak or incorrect conclusions.

These inadequacies have contributed to a persistent issue where students fail to meet the expected standards in practical assessments, which play a crucial role in their overall performance and understanding of physics concepts. This struggle to produce high-quality reports, might jeopardize their academic performance and future prospects in STEM (science, technology, engineering, and mathematics) fields (Muñoz et al., 2020).

1.4 RESEARCH QUESTIONS

1. What are the common mistakes that Advanced level learners make when writing physics practicals?
2. Why do learners make these mistakes in their practical reports write ups?
3. How can teachers assist learners to improve on their practicals report writing skills?

1.5 RESEARCH OBJECTIVES

1. To describe mistakes that learners at Advanced school level in high school in Harare make when writing physics practicals reports.

2. To examine the factors that influence learners to make these mistakes
3. To offer suggestions to educators, educational institutions, and policymakers on how to resolve the difficulties students encounter when writing physics practicals reports at Advanced school level

1.6 HYPOTHESIS / ASSUMPTIONS

1.6.1 Quantitative Hypotheses:

1. **Understanding and Mistakes**: According to Bean & Melzer, (2021). there is a strong positive association between students' comprehension of scientific concepts and their capacity to steer clear of typical mistakes in practical reports. This implies that students who have a better understanding of scientific ideas are more likely to write reports that are precise and organized.

2. **Laboratory Skills and Accuracy link**: Students' laboratory skills and the accuracy of their practical reports show a strong positive link(Al-Nakhle, 2022). This suggests that students are more likely to provide reports with correct data and analysis if they have strong laboratory abilities, such as being proficient with measuring devices and conducting experiments.

1.6.2 Qualitative Assumptions:

1. **Influence of Previous Knowledge and Experience**: Students' capacity to produce successful practical reports is greatly impacted by their past knowledge and experiences with scientific investigation (Darling-Hammond et al., 2020). Pupils who have a solid understanding of scientific principles and have conducted experiments before are more likely to approach practical report writing with competence and confidence.

2. Effect of Teacher direction and Feedback: Students' practical report writing skills are greatly impacted by teachers' direction and feedback (HARIANTI, 2023). Good instructor assistance can assist students in gaining the abilities and information required to generate reports of the highest caliber (Doyle, 2023). This includes giving clear directions, prompt feedback, and opportunity for improvement.

1.7 DELIMITATIONS

This study focuses on pupils studying physics at the Advanced level in high schools in Harare. Useful reports produced during the 2023–2024 school year are going to be used. Techniques for gathering both quantitative and qualitative data are also going to be used in this study.

1.8 LIMITATIONS

1.8.1 Sample Size Restrictions

If the sample size is small, the results may not be as generalizable (Degtiar & Rose, 2023). A more representative image of the difficulties experienced by A-Level physics students in Harare high schools might be obtained with a bigger sample size.

1.8.2 Subjectivity of Researchers in Data Analysis

Subjectivity of researchers in data analysis is a problem, especially when interpreting qualitative data (Ivey, 2023). Researchers can employ inter-rater reliability checks and recognized coding systems to mitigate issue. Inter-rater reliability checks involve having multiple raters evaluate the same data independently and then comparing their results to ensure consistency. This process helps to reduce subjectivity and bias in data analysis.

1.9 DEFINITION OF TERMS

In this section the following selected terms are defined contextually:

1.9.1 Practical Report

A written report that describes the steps, outcomes, and analysis of an experiment is called a practical report.

1.9.2 Scientific Literacy

The capacity to comprehend and use ideas from science.

1.9.3.Laboratory Skills

The capacity to carry out investigations precisely and safely.

1.10 STUDY ORGANISATION

The study is divided into five chapters:

1. **Overview**
   This chapter sets the stage for the study by providing an introduction to the research topic. It outlines the background, problem statement, objectives, research questions, and the significance of the study. Additionally, it defines the scope and key terms to guide the reader through the investigation.
2. **Review of Related Literature;**
   This chapter examines existing literature related to practical report writing in physics, highlighting theoretical frameworks, past studies, and gaps in knowledge. It provides context for the research and establishes the foundation for the study's objectives.
3. **Research Methodology**
   This chapter describes the research design, data collection methods, and sampling techniques used to address the study's objectives. It also outlines how data was analyzed, ensuring the reliability and validity of the findings
4. **Data Presentation, Analysis and Interpretation**
   This chapter presents the collected data in various formats, such as tables, graphs, and cross-tabulations, followed by an in-depth analysis and interpretation. The findings are discussed in relation to the research questions and existing literature, identifying patterns and insights.
5. **Concluding remarks and suggestions**
   The final chapter summarizes the key findings of the study, discusses their implications, and provides recommendations for improving practical report writing in physics. It also suggests areas for further research to address identified gaps

1.11 OVERVIEW OF THE CHAPTER

This chapter laid the groundwork for the study by introducing the research topic and providing the necessary context. It began with a background to the study, highlighting the importance of practical report writing in advanced-level physics and the persistent challenges students face in mastering this skill. The problem statement identifies the gaps and recurring mistakes in practical report writing, emphasizing the need for this investigation. It also outlined the research objectives, which aim to explore the types of mistakes students commonly make, their underlying causes, and potential solutions. The research questions are framed to guide the study, ensuring a focused exploration of the issues. The significance of the study is also discussed, emphasizing its value for educators, curriculum developers, and policymakers in enhancing teaching and learning outcomes in physics. Additionally, the scope of the study is defined, limiting the investigation to advanced level physics students in high schools in Harare.

CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

This chapter examines literature related to the mistakes that A-level physics students make when composing practical reports, with a particular emphasis on titling, reading presentations, tables, graphs, analysis, remarks, and other challenges. The review finds gaps in the literature, draws attention to prior research findings, and lays the groundwork for the current investigation.

According to research, students struggle with writing practical reports because of inadequate understanding of scientific concepts. Melo et al. (2020) emphasize how crucial it is for students to have a solid understanding of scientific concepts to write practical reports effectively. Another factor is inadequate laboratory skills. Russell et al., (2024) stress how important laboratory skills are to drafting effective practical reports. This implies that if pupils don't have these abilities, they will find it difficult to gather and evaluate data correctly.

Inadequate assistance is another factor whereby Chen & Tsai, (2021) emphasize the need for teacher assistance in assisting students with their learning. This suggests that students might gain from receiving more specialized guidance and criticism when drafting actual reports.

Restricted Access to Resources also contributes to students' struggles with writing practical reports. Moyo (2019) emphasizes how resource limitations impact pupils' learning. This shows that students' capacity to carry out experiments and provide quality reports may be hampered by their lack of access to pertinent supplies and tools.

2.2 CHALLENGES IN WRITING PRACTICAL REPORTS

Studies show that pupils face difficulties with inadequate clarity and precision on report titles whereby report titles are overly general or ambiguous and may not adequately convey the goal and information contained inside (Gastel & Day, 2022). For instance, a title such as "Science Experiment" is very broad and fails to furnish particular details regarding the experiment. Students can also produce Incomplete or erroneous titles whereby titles may be lacking important information or have spelling mistakes or omissions.

Another challenge is of in presenting readings whereby students can present measurements that are unclear. Students may find it difficult to record measurements precisely or to use the right units. For instance, they can use the incorrect units for a measurement or write "10 cm" rather than "10.2 cm." students also produce inaccurate or inconsistent data recording. Inaccurate or inconsistent data recording might result in mistakes in analysis and interpretation.

Students also face challenges in graphs and tables. Usually, students use inappropriate scale. When graphs have improper scales, it might be challenging to understand the data. Also, students insufficiently label their graphs: It might be challenging to interpret the data's significance when axes are not labelled precisely or clearly. Some Data will not be well-organized whereby Information may be presented in a way that is difficult to understand and follow.

Evaluation and Remarks is also a challenge to students whereby student produce inadequate conclusions. Students could come to conclusions that are unduly generalized or unsupported by the data. There is also lack of critical thinking, students could not evaluate the evidence carefully or take into account different explanations for their conclusions. Ignorance of the evidence is another challenge whereby students might just report their findings without questioning or evaluating their significance.
Sometimes students are not aware of the Goal. They cannot clarify objectives of an experiment. Students may find it difficult to state the experiment's goal or the research question they are attempting to address (Willingham, 2021). Also students might gather incomplete or irrelevant data, which could result in erroneous inferences (Little & Rubin, 2019)

Students also face challenges in interpretation and analysis of data. They face challenges to derive significant inferences from their data if they are not proficient in statistical analysis methods (Mertler et al., 2021). They might undervalue its significance, which would produce inaccurate outcomes (Montero Llopis et al., 2021).

In the Structure and Format of a practical report students could find it difficult to follow the introduction, methods, results, discussion, and conclusion sections of a scientific report, which are all standard (Schneider et al., 2021). Their reports may be hard to grasp since they struggle to communicate their ideas succinctly and clearly (Guskey & Bailey, 2024).

Students also face challenges in time management whereby they fail to meet deadlines. students might have to finish their reports by a certain date, which might be challenging to achieve. They could find it difficult to assign enough time to each section of the report and to prioritize assignments (LaCharity et al., 2021).

Students lack guidance in producing their reports, Students' chances of making progress on their practical reports may be limited if they do not receive sufficient feedback from their teachers (Guskey & Bailey, 2024). They might not have as much access to resources such online lessons or textbooks that can aid in the development of their writing abilities (Kawinkoonlasate, 2021).

2.3 ELEMENTS THAT LEAD TO MISTAKES RESEARCH ARE:

Lack of understanding leads to mistakes in report writing, poor knowledge of scientific ideas and inadequate report-writing abilities contributes to poor reports(Likwa & Mweenda, 2019). Insufficient Teacher Guidance also contribute to inadequate assistance and feedback (Segabutla & Evans, 2019). Sometimes language barriers leads to difficulties with expression and technical vocabulary (Tenzer et al., 2021).

Insufficient physics comprehension may be challenging for students to appropriately apply basic physics ideas in real-world scenarios due to their poor grasp of them (Assem et al., 2023). Lack of experimental procedures leads to students not fully comprehend the protocols, which could result in mistakes being made when gathering or analyzing data (Rassel et al., 2020).

In experiment design, inadequate arrangement is a mistake that is common to students. If students don't plan their experiments well, the results could be inadequate data or badly constructed processes (Antony, J. (2023).

In data handling, students can find it difficult to guarantee the precision and accuracy of their measurements, which could cause mistakes in their findings (Congalton and Green, 2019). Data recording could be a challenge for students to examine their data if it is not accurately or clearly recorded (Love & Wright, 2021).

Students may struggle to derive significant inferences from their data due to a lack of expertise in statistical analysis methods (Mertler et al., 2021). They might not be aware of the significance of error analysis or the proper methods for calculating and propagating uncertainty (Thorman, 2020).

Poor writing skills also lead to errors in report writing, students lack clarity and coherence. Students may find it difficult to articulate their thoughts in their reports in a clear and coherent manner (Reiser et al., 2021). Their work may be difficult to understand because they do not adhere to the usual structure and format of scientific papers (Ortony et al., 2022).

Insufficient support and feedback is also another lead to mistakes. Students lack teacher direction, If teachers don't provide students with enough direction and feedback, it will limit their chances to grow (Tomlinson & Imbeau, 2023). Students also lack peer support. they might not get the chance to work together and share knowledge with their peers (Mead et al., 2021).

2.4 TECHNIQUES FOR ENHANCEMENT

Studies suggest that explicit instruction can enhance students performance. Students' performance depends on the teaching of report writing techniques and the provision of precise instructions (Morrison et al., 2019). This offers detailed guidance on how to utilize data and evidence appropriately, how to use scientific language, and how to organize a practical report.

Feedback and Peer Review also enhance performance whereby students can pinpoint areas for growth and advance their writing abilities by receiving regular feedback and

peer evaluation (Kadhani, 2019). While peer review allows students to get new views and learn from each other, teachers can offer specific criticism on students' reports.
Using templates and Guidelines is also a strategy to enhance report writing. Giving students organized report writing templates will help them arrange their ideas and make sure their reports adhere to the required format (Chidakwa, 2020). Additionally, templates can lessen students' cognitive burden and help them write more effectively.

Another technique is to strengthen comprehension. Assigning students to go over basic principles of physics and how they apply to real-world investigations. To strengthen comprehension of methods and data analysis, offer guided experience in conducting experiments (Tracy, 2024). Giving students worksheets to assist them in designing their experiments, including setting goals, figuring out variables, and laying out steps also helps to good reports.

Time management strategies also help to come up with good reports. To make sure students have adequate time to finish the experiment, teach them efficient time management methods.
Accuracy and precision training is also a technique to enhance report writing. Educating people on how to use measurement devices precisely and accurately. To guarantee uniformity and clarity, give students standardized data recording templates.
Another technique is to foster analytical proficiency. Provide instruction on statistical analysis methods pertinent to physics experiments. Practice calculating and spreading uncertainty with error propagation exercises.

Students and teachers should do scientific writing workshops. Holding workshops where the main topics are structure, coherence, and clarity in scientific writing. Peer review also sssign feedback and point out areas for improvement to students by having them review each other's reports.
Regular comments will offer sufficient assistance to students. Give students regular comments on their practical reports, emphasizing both their areas of strength and growth. Consistent practice and reinforcement of report writing techniques (Nyoni, 2019).

2.5 THEORETICAL FRAMEWORKS

This study's theoretical underpinnings include the constructivist theory which is a theoretical framework that highlights the learners' active participation in creating their own knowledge. According to this view, people actively interact with their experiences and develop mental images of the outside world rather than passively taking in information (Vuong, 2023).

Practical report writing implications are active learning, rather than just taking in information passively, constructivism contends that students should actively participate in their education (Shah, 2019). Inquiry-based learning, practical experiments, and chances for exploration and discovery can all help achieve this.

Another implication is meaningful learning. Learning experiences need to be pertinent and linked to students' past knowledge in order for them to develop meaningful knowledge (Hsbollah & Hassan, 2022). This can be made easier by giving examples and applications of physics ideas from everyday life.

Scaffolding is another implication; by giving advice, giving comments, and utilizing visual aids, teachers can support students' learning through scaffolding (Hsbollah & Hassan, 2022). Constructivism also highlights the value of interpersonal communication and teamwork. Students can exchange ideas, pick up knowledge from one another, and hone their critical thinking abilities by working in groups (Pande & Bharathi, 2020).

Social cognitive is another theory underpinning this study Albert Bandura (1977) developed the Social Cognitive Theory (SCT), which places a strong emphasis on the functions of imitation, reinforcement, and observation in learning. According to this hypothesis, people pick up new behaviors by seeing how others behave, copying what they do, and experiencing rewards or penalties for their own activities.

Implications of social cognitive for practical report writing are modelling, reinforcement and self-efficacy. In modelling, by seeing and copying the actions of proficient writers, such as instructors or accomplished students, students can pick up efficient practical report writing techniques (Goodson, 2023).

On reinforcement. students might be inspired to develop their practical report writing abilities by receiving positive reinforcement, such as compliments or recognition (Barkley & Major, 2020).

Self-efficacy, or a person's confidence in their capacity for success, is another important concept highlighted by SCT. Pupils who believe in their own abilities are more likely to keep trying to get better at producing practical reports (Guskey & Bailey, 2024).

Another theory is Cognitive Load Theory (CLT). According to John Sweller's (1988) Cognitive Load Theory (CLT), learners have a certain amount of working memory capacity, and too much cognitive load might impede learning. According to this idea, learners' cognitive resources become overloaded when they are given too much information to comprehend at once, which reduces learning and comprehension.

Practical Report Writing Implications of the Cognitive Load Theory are Information Overload, Schema Activation, Chunking and Guided Practice. In Information Overload, writing a practical report requires handling a variety of information sources, such as formatting requirements, scientific concepts, and experimental results. Students may experience cognitive overload as a result of this, especially if they are ill-prepared or don't have enough help (Ntlhakana & Alli, 2024).

Cognitive Load Theory places a strong emphasis on the activation of pertinent schemas, or mental models of knowledge. Teachers can assist students activate relevant schemas and lower cognitive load by giving them clear instructions, examples, and context (Shin, 2020).

Another strategy for lowering cognitive load is to break up knowledge into smaller, easier-to-manage chunks (Shin, 2020). For instance, students can divide the work of composing a practical report into manageable chunks, including gathering information, deriving conclusions, and composing the summary. Giving students opportunities for feedback and guided practice can help them gain the abilities and knowledge necessary to properly regulate cognitive load (Clark & Mayer, 2023).

The Theory of Self-Determination (SDT) is also a theory which underpins this study . According to Guay (2022) Self-Determination Theory, the three psychological needs are autonomy, competence, and relatedness, have an impact on learners' motivation and engagement.

In autonomy, If students believe they have control over their education and are able to make their own decisions, they are more likely to be driven to write excellent practical reports (Bean & Melzer, 2021). Giving kids options for choice and self-direction within the work can help with this.

If students believe they are competent and capable of finishing the assignment, they are also more likely to be driven (Schunk, 2023). Clear directions, sufficient resources, and chances for feedback and development can all help to promote this.

Lastly, if kids experience a sense of belonging and support from their professors and peers, they are more likely to be driven (Rodriguez & Blaney, 2021). This can be promoted by establishing a welcoming and encouraging learning atmosphere. Teachers can provide learning environments that encourage students' motivation and participation in practical report writing by comprehending the consequences of self-directed learning.

2.6 RESEARCH GAPS

Although previous studies have looked into the difficulties students have when writing practical reports, the following is still necessary:

1. **Put the emphasis on Harare High School A-Level Physics Students:** There is a dearth of empirical studies that particularly target A-Level physics students in Harare high schools, despite general research on practical report writing issues. Such research would offer insightful information on the particular difficulties and requirements that students face in this setting.
2. **Examinations of Particular Mistakes**: While earlier studies have pointed up broad difficulties, more thorough examinations of the particular mistakes made by students in their practical reports are required. By recognizing these mistakes, educators can create focused treatments to deal with them.
3. **Development of Targeted Teaching Strategies:** Although some studies have offered viable approaches to enhance practical report writing, more investigation is required to create and assess targeted teaching strategies that are especially intended to address the difficulties faced by high school students in Harare who are pursuing A-Level physics.

2.8 OVERVIEW OF THE CHAPTER

This chapter addressed the research on the difficulties A-level physics students have while producing practical reports, emphasizing the causes of mistakes and corrective measures. The study's theoretical framework served as its basis. Research gaps were found, which supported the necessity of this study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research approach used to look into the mistakes made by A-level physics students in high schools in Harare when they write practical reports.

3.2 RESEARCH DESIGN

This study looks into the difficulties A-level physics students have in producing meaningful physics practical reports using a mixed-methods research methodology as the most suitable research design. A thorough grasp of the research issue is made possible by the combination of quantitative and qualitative data collecting and analysis techniques found in a mixed-methods approach (Kimmons, 2022). This design allows the researcher to explore the issue comprehensively by leveraging both numerical data and personal insights.

3.2.1 Research Paradigm/Philosophy

For my research on A-level students' challenges in producing meaningful physics practical reports, I used Pragmatism which supports the use of both qualitative and quantitative methods. It focuses on practical outcomes, and provides flexibility to adapt the research process to the specific needs of my study. Pragmatism is ideal for mixed-methods research as it emphasizes practical solutions to real-world problems by combining both qualitative and quantitative methods. Pragmatism views knowledge as both objective and subjective, allowing me to explore both statistical patterns (objective) and personal insights (subjective) to understand why students struggle with practical reports.

Pragmatism focuses on the practical outcomes and solutions, which aligns with the goal of developing strategies to overcome students' report-writing challenges. Pragmatism is concerned with what works in practice. It encourages using methods that best solve the research problem, rather than adhering to a strict set of methodological rules (as in positivism or constructivism). Pragmatism is closely aligned with action-oriented research.

The paradigm suggests that research should aim to effect change, which resonates with your objective of improving the teaching and learning of physics practicals. Since the research aims to identify practical solutions to improve students' performance, this aligns perfectly with a pragmatic approach. By focusing on practical outcomes and creating actionable steps to enhance students' performance in physics practicals', pragmatism aligns with my aim of applying research findings to real-world educational challenges.

3.2.2 Research Methodology

Quantitative Component:

Quantitative approach is going to be used to systematically describe the common mistakes and difficulties in students' practical reports and quantify their prevalence. Document Analysis and Tests are going to be used in quantitative approach.

Survey: A sample of high school students in Harare pursuing A-level physics will be given a survey to gather information on their experiences, opinions, and the prevalence of particular mistakes in practical report writing.

Document Analysis: A sample of the practical reports submitted by the students will be examined to find recurring mistakes, trends and frequency of mistakes in data presentation, graph plotting and analysis. Using the ZIMSEC syllabus 6032, samples of students reports were included in the research to show evidence of the mistakes made

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Tests: Practical tests will be administered to quantitatively measure students' competencies in specific areas of report writing. This data will help in determining specific areas where students struggle the most.

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The descriptive research design helps in providing a statistical overview of the issues, revealing patterns and informing the general scope of the problem.

Qualitative Component:

Qualitative approach is going to be used to gain deeper insights into students' and teachers' experiences and perspectives regarding the challenges in writing practical reports. Questionnaires, Interviews and Focus Groups will be used in Qualitative approach.

- **Questionnaires**: Open-ended questions will allow students and teachers to elaborate on their views about the challenges faced. This will help uncover the reasons behind difficulties and provide a more nuanced understanding.

- **Interviews**: To obtain comprehensive information on the experiences and viewpoints of instructors and students on practical report writing, semi-structured interviews will be held with a sample of teachers and students. This will provide a richer understanding of the subjective experiences related to the difficulties in report writing.

- **Focus Groups**: Students will participate in focus groups to discuss their opinions and common experiences regarding the difficulties involved in drafting practical reports.

The exploratory design is crucial for capturing the perspectives, emotions, and challenges that quantitative data alone might not reveal.

Mixed Methods Design allows complementary strengths whereby the combination of qualitative and quantitative data allows for a comprehensive analysis. While quantitative methods help to statistically represent the frequency and nature of students' mistakes, qualitative methods provide the depth needed to understand why these challenges occur.

Using Mixed Methods, I can do triangulation by cross-validating my findings by comparing the results from document analysis, questionnaires, and tests. This adds rigor to my research and strengthens the credibility of my conclusions.

Mixed-methods research ensures a holistic understanding whereby both the measurable aspects of the problem (e.g., types of mistakes in reports) and the personal insights (e.g., students' and teachers' views on why these mistakes occur) are fully explored.

3.2.3 Research Strategy

The research questions are thoroughly investigated using a case study approach (Martinsuo & Huemann, 2021).

This research is especially well-suited for a case study technique, which enables an in-depth examination of the difficulties A-Level physics students encounter when composing practical reports. Researchers can design focused methods for improvement and obtain a deep understanding of the elements contributing to these issues by concentrating on particular examples.

In particular, an exploratory research approach is used in this study to pinpoint and characterize the mistakes committed by A-level physics students. Since the goal of this study is to identify and characterize the difficulties faced by students rather than to test particular theories or hypotheses, an exploratory research design is acceptable. Through comprehensive examination, scholars can enhance their comprehension of the elements that give rise to these difficulties and pinpoint domains that require additional study (Tracy, 2024).

The research focuses on understanding the specific difficulties in title formulation, data presentation, graph construction, analysis, and commentary in practical reports. A case study strategy enables me to explore these issues comprehensively, taking into account the various factors affecting students' performance in this area (e.g., instructional methods, student understanding, curriculum design).

The challenges students face in writing physics practical reports are influenced by the educational environment, teacher support, and available resources. A case study strategy allows the researcher to explore these contextual factors, providing a richer understanding of the problem and enabling her to develop context-specific solutions.

Since a mixed-methods approach is being employed, the case study strategy supports the use of both qualitative (e.g., questionnaires) and quantitative (e.g., tests, document analysis) methods. This strategy accommodates the diverse data sources used to explore the problem from multiple angles.

The challenges faced by students in producing practical reports are likely multifaceted, influenced by both student competencies and the quality of instruction. A case study enables to explore these multiple perspectives in depth, which is essential for identifying the underlying causes of the problem and developing effective interventions.

3.3 RESEARCH METHODS

3.3.1 Population and Sampling

All A-level physics students who are currently studying or have recently completed A level physics and all physics teachers responsible for guiding students through practicals and assessing their reports from high schools following the ZIMSEC syllabus in Harare make up the study's population. Thirty pupils, ten teachers, and five high schools are chosen by means of purposeful sampling (Patton, 2002).

Purposive Sampling:

This non-probability sampling method chooses participants according to how relevant they are to the study subject (Pace, 2021). Purposive sampling is utilized in this study to identify schools, instructors, and students who may be able to provide important insights into the difficulties A-Level physics students encounter when composing practical reports. Purposive sampling enables to focus specifically on students who have known challenges with report writing, purposive sampling helps target that group.

High Schools

• **School Size**: To reflect various learning contexts and potential differences in resources and assistance, a mix of large and small schools was chosen.

• **Location:** To accommodate differences in socioeconomic circumstances, access to resources, and instructional methods, schools were situated throughout Harare.

• **Academic Performance**: To investigate the effects of school context on students' experiences and difficulties in producing practical reports, schools with a range of academic performance levels were included.

Teachers

• **Experience**: To represent a range of viewpoints and methods for instructing students in practical report writing, teachers with differing degrees of experience were chosen. Both more seasoned educators and novice educators were included in this.

Learners

• **Academic success:** To investigate the connection between student accomplishment and difficulties in practical report writing, students with different degrees of academic success were chosen. Students with good, average, and poor academic achievement were included in this.

The study sought to guarantee that the sample was representative of the population of A-Level physics students in Harare high schools and that the results could be applied to a larger group of students and institutions by choosing participants according to these criteria.

3.3.2 Data Collection Methods Instruments

A combination of quantitative and qualitative data gathering and analysis techniques is used in a mixed-methods approach (Kimmons, 2022).

A more thorough and in-depth knowledge of the difficulties A-Level physics students encounter while writing practical reports is made possible by this mixed-methods approach. Through the integration of quantitative and qualitative data, scholars can obtain a more comprehensive understanding of the problem and recognize both shared trends and unique experiences (Tracy, 2024).

Document Analysis Framework/Checklist

Document analysis checklist is going to be used to systematically review existing student physics practical reports so as to identify mistakes, gaps, and weaknesses. A structured checklist is going to be designed to guide review of the reports. This should include criteria such as:

- **Title formulation**: Clarity and relevance.
- **Data presentation**: Accuracy and format of tables and readings.
- **Graphs**: Appropriateness of graph types, accuracy of data plotting, and labelling.
- **Analysis**: Depth of analysis and application of scientific principles.

- **Comments and Conclusions**: Quality and relevance of student reflections and conclusions.

This framework ensures a consistent and thorough review of reports, allowing you to pinpoint specific problem areas across different student submissions.

Questionnaires

Questionnaires are going to be used to collect qualitative and quantitative data from students and teachers regarding their experiences and perceptions of the practical report-writing process.

Two separate questionnaires are going to be designed for:

- **Students**: Include both closed-ended (e.g., Likert scale) and open-ended questions to explore their difficulties with report writing (e.g., time spent, understanding of concepts, challenges with data interpretation).
- **Teachers**: Focus on their perceptions of students' challenges, the support they provide, and the teaching methods they use.

Example questions:

- **For students**: "On a scale of 1-5, how difficult do you find the process of data interpretation in physics practicals?"
- **For teachers**: "What do you consider the most common challenge students face when writing practical reports?"

Questionnaires allow you to gather a wide range of perspectives efficiently, helping you to understand both the students' and teachers' viewpoints on the report-writing process.

Practical Competency Tests

Practical tests are going to be administered to assess students' abilities to conduct and report on physics experiments. Tests are going to be designed that focus on key areas of the practical report-writing process, such as:

- Accurately taking and recording readings.
- Presenting data in tables and graphs.
- Conducting a basic analysis and drawing appropriate conclusions.

A standardized rubric is going to be used to score performance, focusing on areas like data presentation, graphing, and analysis.

Direct testing provides quantitative data on students' practical skills and helps identify specific gaps in their abilities to complete practical reports.

Report writing session observations

Seeing students work on real reports will provide you a better understanding of their habits, difficulties, and the efficacy of various teaching methods. This can also assist in pinpointing particular areas in which pupils might require more assistance or direction.

ITEM	**Correct**	**Incorrect**
Heading and Labeling		
Significant Figures		
Organization of Data (Intervals)		
Units		
Precision		
Uncertainties		
Recording Data		
Derived Quantities		

Figure 1: Observation Checklist

Interviews or Follow-up Focus Groups

Conducting in-depth interviews or focus groups with a smaller sample of students and teachers to explore challenges in more detail. Interviews with educators and students can yield detailed information about their viewpoints and experiences with producing practical reports (Hatch, 2023). This can include exploring students' challenges, their perceptions of the teaching strategies used, and their suggestions for improvement.

Semi-Structured Interview Guide are going to be used which Include questions based on findings from the document analysis and questionnaires to dig deeper into the reasons behind certain challenges.

For students: "Can you describe a recent practical experiment where you struggled with the report? What part did you find the most difficult?"

For teachers: "In your experience, what support do students need most in learning how to write practical reports?"
Interviews or focus groups allow you to explore complex issues that may not be fully captured by the questionnaires or document analysis, offering richer qualitative insights.

These methods and instruments will allow you to gather comprehensive data from both a qualitative and quantitative perspective, ensuring a well-rounded understanding of the challenges students face in writing meaningful physics practical reports.

3.3.3 Data Analysis Methods/Instruments

For the research a mix of quantitative and qualitative data analysis methods are needed, given the mixed-methods approach. Here are the data analysis methos going to be used.

Thematic analysis for Document Analysis: This approach entails creating a coding framework based on the key elements of physics practical reports (e.g., title, data presentation, graph construction, analysis, conclusions). Use this to systematically categorize the mistakes or gaps in students' reports.
The analysis process includes identifying recurring patterns or common issues in each section of the reports (e.g., incorrect graph labelling, poorly formulated titles). Group the data into themes (e.g., "poor graph interpretation," "weak data analysis," "incomplete conclusions").
Thematic analysis allows you to extract qualitative data from the reports and identify the most common challenges students face, as well as possible root causes of these difficulties.

Thematic analysis for qualitative data : One popular technique for examining qualitative data is thematic analysis of field notes and interview transcripts. This approach entails locating and examining themes or patterns that show up in the data. Through the identification of these topics, scholars can acquire a more profound comprehension of the obstacles encountered by A-Level physics students while composing practical reports.

Descriptive statistics for quantitative data: Descriptive statistics are useful for summarizing and characterizing quantitative data, including the distribution of survey scores or the prevalence of particular mistakes. This can assist academics in finding patterns and trends within the data allowing for more generalizable conclusions

Using content analysis to analyze documents: Content analysis is a technique for examining written or textual data, including useful reports. Using this procedure, each word, phrase, or concept that appears in the papers is identified and counted. Through the examination of practical reports, scholars can detect recurring mistakes and trends in the compositions produced by students (Ferris & Hedgcock, 2023).

3.4 RELIABILITY AND VALIDITY

The following tactics will be used to guarantee the research's reliability, objectivity, transferability, credibility, and trustworthiness:

Data sources and methodologies triangulation:

Various data sources: A range of data sources, such as surveys, interviews, observations, and document analysis, will be used to gather data. This will lessen the possibility of bias and help to guarantee the veracity of the results.

Multiple methods: The study will employ a blend of quantitative and qualitative methodologies to offer a more all-encompassing comprehension of the subject matter. This will additionally enhance the reliability of the results.

Member checking:

To make sure the results appropriately represent the experiences and viewpoints of the participants, the findings will be distributed to them. Member checking is a procedure that can help raise the research's legitimacy and dependability.

Peer debriefing:

To get input and make sure the data analysis and interpretation are thorough and impartial, the research will be addressed with peers. This procedure may aid in finding any biases or restrictions in the study.

Thick description:

To improve the transferability of the findings to different settings and contexts, comprehensive and vivid explanations of the research context, participants, and data will be supplied. This will additionally contribute to guaranteeing the reliability of the study

3.5 ETHICAL ISSUES

In order to guarantee ethical behaviour during the research, the subsequent actions will be implemented:

Research licenses from the Ministry of Education secured:
The Ministry of Education will provide the required permits in advance of the research project in order to guarantee that it conforms with all applicable laws and policies. The rights and interests of participants as well as the participating institutions will be better protected as a result.

Participant-signed informed consent forms:
Informed consent paperwork outlining the goals of the study, any possible risks or benefits, and the participants' ability to withdraw from the study at any time will be given to each and every participant. Before taking part in the study, participants will be required to sign and date the informed consent forms.

Anonymity and confidentiality are guaranteed:
To preserve their privacy, participant data will be anonymized and participant names will remain secret. This will guarantee that participants can freely share their viewpoints and experiences without worrying about the consequences.

3.6 CHAPTER SUMMARY

This chapter described the study technique, which used a mixed-methods approach and pragmatism perspective. A thorough analysis of the research issues was made possible by the exploratory research design and qualitative case study methodology.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 INTRODUCTION

This chapter focuses on presenting, analyzing, and interpreting the data collected to investigate the mistakes made by Advanced Level Physics students in writing practical reports. The aim is to identify the nature and frequency of these mistakes, explore the underlying factors, and evaluate their impact on students' performance.

The chapter begins with a detailed presentation of the data in tables and graphs, highlighting key findings. This is followed by an analysis of the results to identify patterns and correlations. Finally, the findings are interpreted in light of the research objectives and existing literature to draw meaningful insights and recommendations.

4.1 DEMOGRAPHIC DATA OF RESPONDENTS

4.1.1 Distribution of Teachers According to their Advanced Level Physics Teaching Experience

The teaching experience of Advanced Level Physics Teachers plays a significant role in shaping students' understanding of practical concepts and report-writing skills. To explore this relationship, the study categorized teachers based on their years of teaching experience. Table 4.1.1 presents the distribution of teachers according to their Advanced Level Physics teaching experience across the sampled high schools in Harare.

Number of Years	**Number of Teachers**	**Percentage**
Less than 1 Years	1	10%
1-5 Years	5	50%
6-10 Years	3	30%
11 years and Above	1	10%

Table 4.1.1: Distribution of the Teachers according to their Advanced Level Physics Teaching Experience

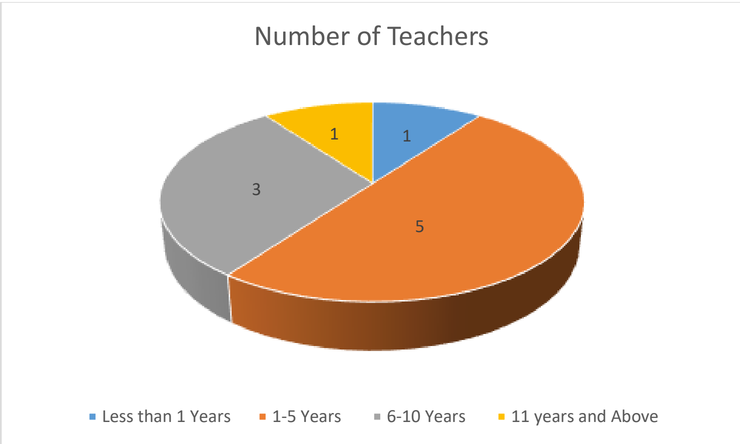


Figure 4.1.1: Pie Chart: Distribution of the Teachers according to their Advanced Level Physics Teaching Experience

The distribution shows that the teaching staff in this study is predominantly made up of teachers with 1-5 years of experience (50%), followed by those with 6-10 years of experience (30%). The 10% of teachers with more than 11 years of experience, combined with the 10% with less than 1 year of experience, suggests a relatively young teaching cohort in terms of tenure. This distribution may impact the teaching of practical report writing, as teachers with fewer years of experience may still be developing the skills and knowledge needed to teach complex tasks such as practical report writing effectively. The large proportion of less experienced teachers may indicate a need for professional development in specific areas such as experimental report writing and mentoring skills for younger educators. On the other hand, the presence of mid-level experience teachers suggests there is still a good amount of stability and knowledge within the teaching team.

4.1.2 Learners Ordinary Level Results in Physics

Students' performance in Ordinary Level Physics is a key indicator of their foundational understanding of the subject, which directly impacts their ability to excel in A Level practical. To explore this relationship, learners' Ordinary Level Physics grades were analyzed. Table 4.1.2 presents the distribution of Ordinary Level Physics results among the sampled A Level students

Grade	Number of Learners	Percentage
A	18	36
B	20	40
C	9	18
D	3	6

Table 4.1.2: Learners O Level Results in Physics

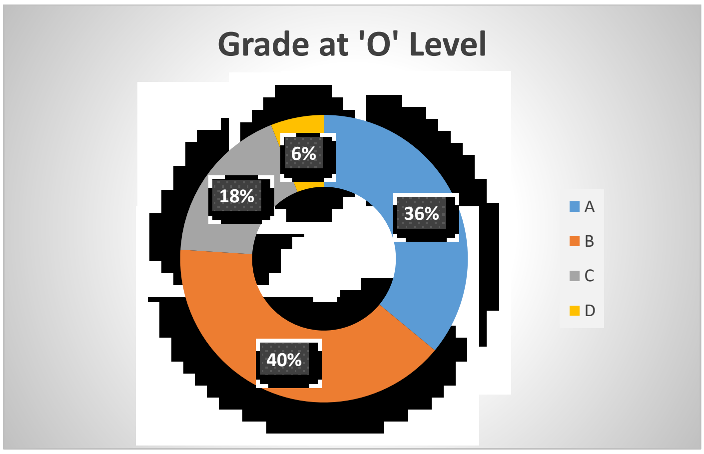


Figure 4.1.2: Pie Chart Showing Learners Ordinary Level Results in Physics

The performance distribution indicates that the majority of students (76%) have relatively strong academic backgrounds in physics (Grades A and B), which may suggest they are likely to perform better in practical work as well. However, there is a moderate proportion of students (18%) with average scores, and a small but notable group (6%) with below-average results. These latter groups may face more challenges in writing practical reports and in their general performance during practicals, potentially requiring focused support to improve their skills. The overall strong academic performance of students in their O-level exams suggests that they may have the potential to succeed in practical, though targeted support and clear instructional strategies could be essential for the lower-performing students, particularly those in the **C** and **D** categories.

4.2 COMMON MISTAKES IN PRACTICAL REPORT WRITING

4.2.1 : Error Frequency in Table Data Presentation

Accurate data presentation in tables is a critical skill in practical report writing, as it forms the foundation for effective analysis and interpretation. To identify the most common mistakes made by students in this area, an analysis was conducted on their practical reports. Table 4.2.1 presents the frequency of mistakes observed in table data presentation.

Error Type	**Number of Students out of 50**	**Frequency (%)**
Incorrect Heading and Labeling	30	60
Inconsistent or Improper Significant Figures	22	44
Poor Organization of Data (Intervals)	17	34
Missing or Inappropriate Units	15	50
Inadequate or Excessive Precision	28	56
Failing to Indicate Uncertainties	36	72
Recording Incorrect or Inconsistent Data	24	48
Neglecting Derived Quantities	21	42

Table 4.2.1 Error Frequency in Table Data Presentation

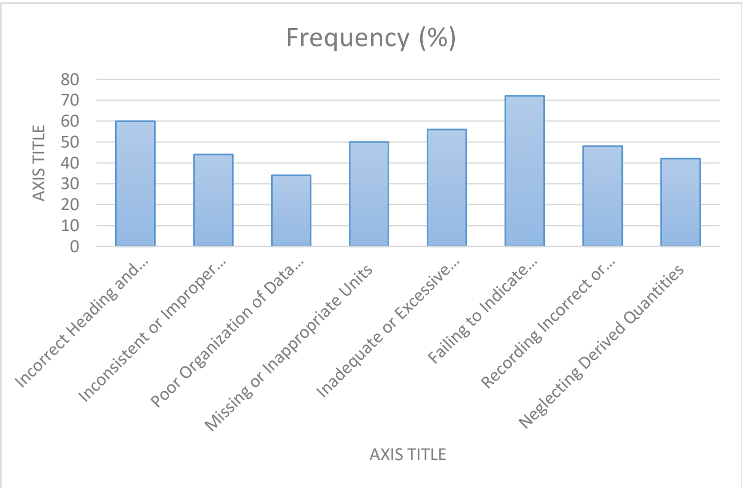
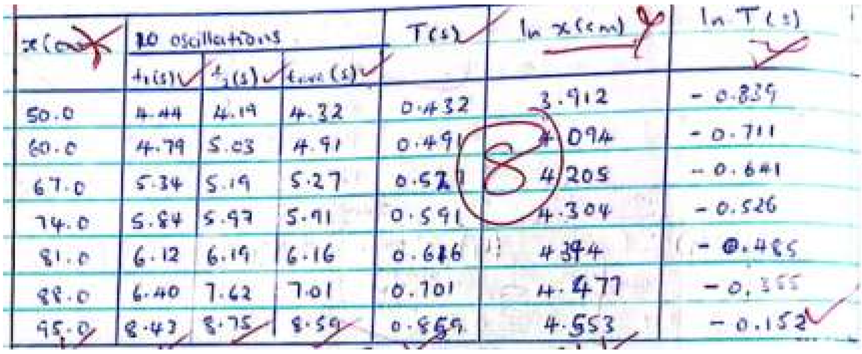


Figure 4.2.1: Bar Graph showing error frequency in table data presentation

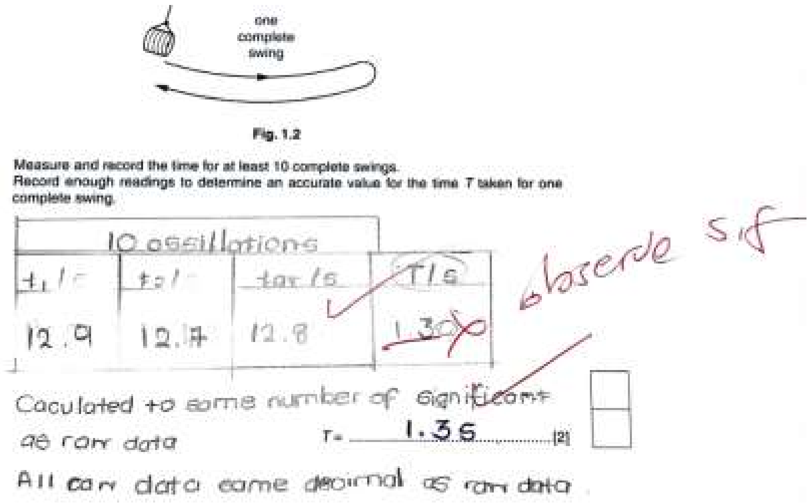
The findings highlight several key areas where students face challenges in their practical report writing. The most frequent mistakes (failing to indicate uncertainties, incorrect headings, and improper labelling) point to gaps in students' understanding of basic scientific reporting conventions. Picture below shows work of a student with incorrect heading and labelling.



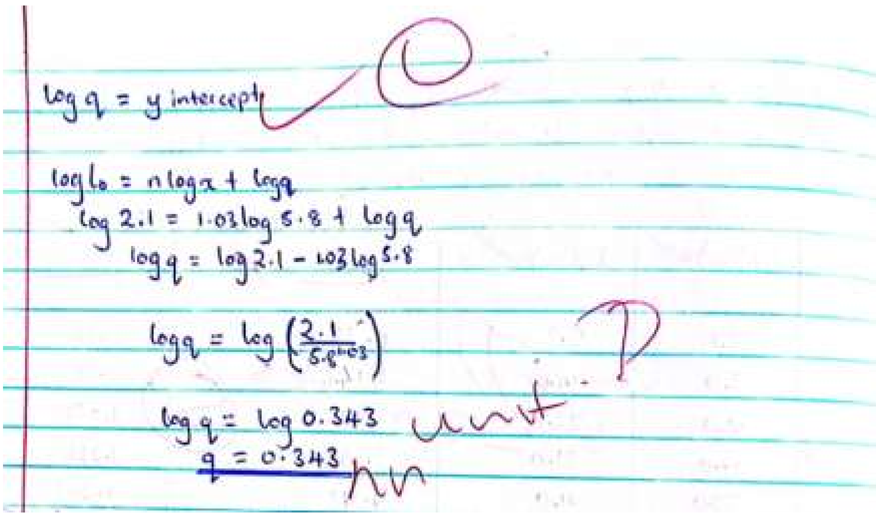
x (cm)	10 oscillations			T(s)	ln x(cm)	ln T(s)
	t_1(s)	t_2(s)	t_{ave}(s)			
50.0	4.44	4.19	4.32	0.432	3.912	-0.839
60.0	4.79	5.03	4.91	0.491	4.094	-0.711
67.0	5.34	5.19	5.27	0.527	4.205	-0.641
74.0	5.84	5.97	5.91	0.591	4.304	-0.526
81.0	6.12	6.19	6.16	0.616	4.394	-0.485
88.0	6.40	7.62	7.01	0.701	4.477	-0.355
95.0	8.43	8.75	8.59	0.859	4.553	-0.152

Picture 1: Student Work with Incorrect Heading and Labelling

Moreover, mistakes related to precision, significant figures, and unit usage reflect the need for more comprehensive training in how to present data accurately and consistently. Picture below show work of a student who had a mistake in observing significant figures and the other one shows a student who had omitted to insert units.



Picture 2: Student Work with Mistake in Significant Figures



Picture 3: Student Work who had Omitted to Insert Units

These areas should be targeted for intervention in both teaching practices and student training to improve the quality of practical report writing.

4.2.2: Error Frequency in Graph Presentation

To understand the common challenges students, face in graphical analysis, it is essential to analyse the frequency and types of mistakes they make when plotting and interpreting graphs. Table 4.2.2 summarizes the frequency of different types of graph-related mistakes observed in this study.

Error Type	**Number of Student out of 50**	**Frequency (%)**
Incorrect Axis Labeling and Scaling	23	46
Poor Plotting of Points	19	38
Incorrect or Incomplete Best Fit Line	28	56
Ignoring Uncertainties	34	68
Poor Graph Aesthetics and Technical Details	26	52
Mistakes in Gradient Calculations	29	58
Incomplete Analysis of the Graph	33	66
Mistakes in Intercept Determination	30	60
Misuse of graph paper	27	54
Misinterpreting Graphical Trends	24	48

Table 4.2.2 Error Frequency in Graph Presentation

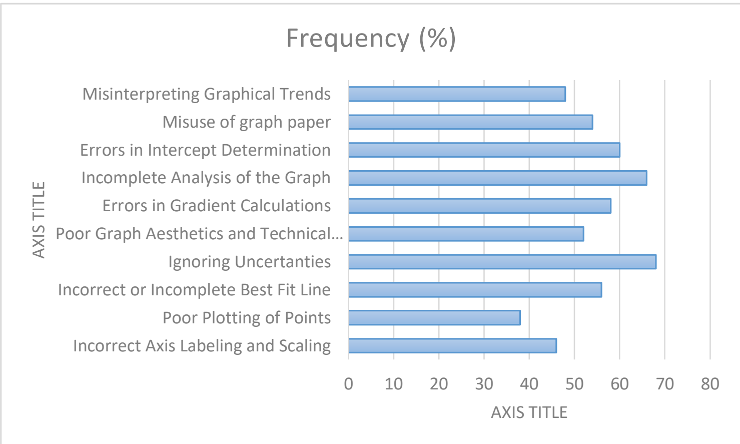
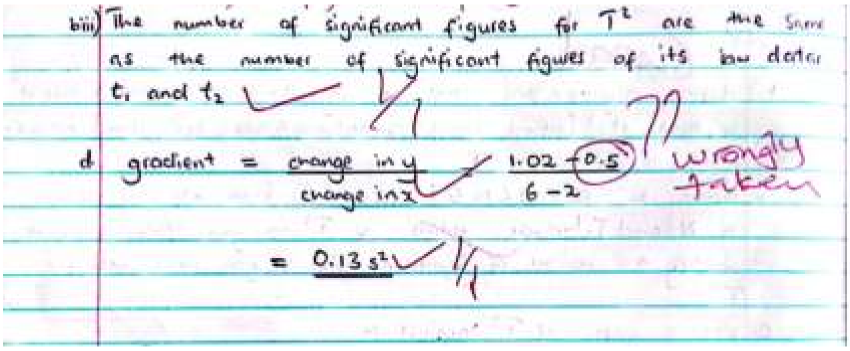


Figure 4.2.2 Bar Graph Showing Error Frequency in Graph Presentation

The mistakes highlighted above emphasize the difficulties students face in accurately presenting and analyzing graphical data. The most frequent issues, such as ignoring uncertainties, incomplete analysis, and mistakes in gradient calculations, suggest that students require more focused guidance and practice in graphical techniques. Picture below shows work of a student who had failed to take a reading from the graph for gradient calculation.



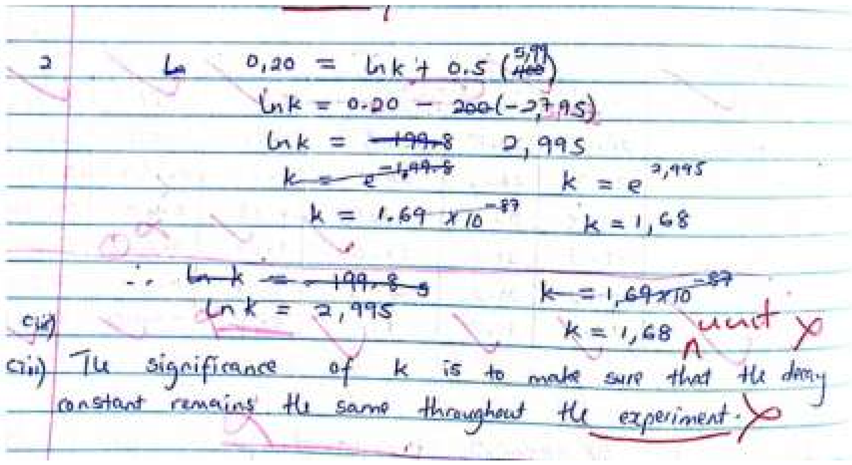
biii) The number of significant figures for T^2 are the same as the number of significant figures of its raw data t_1 and t_2

d gradient $= \frac{\text{change in } y}{\text{change in } x} = \frac{1.02 - 0.5}{6 - 2}$?? wrongly taken

$= 0.13\ s^2$

Picture 4:Shows Work of a Student with Mistake in Gradient Calculation.

Picture below shows a work of a student who had failed to analyse the results of an experiment.



2 Ln $0{,}20 = \ln k + 0.5$

$\ln k = 0.20 - 200(-2{,}795)$

$\ln k = \cancel{-199.8}\quad 2{,}995$

$\cancel{k = e^{-1{,}99.8}}\qquad k = e^{2{,}995}$

$k = 1.69 \times 10^{-87}\qquad k = 1{,}68$

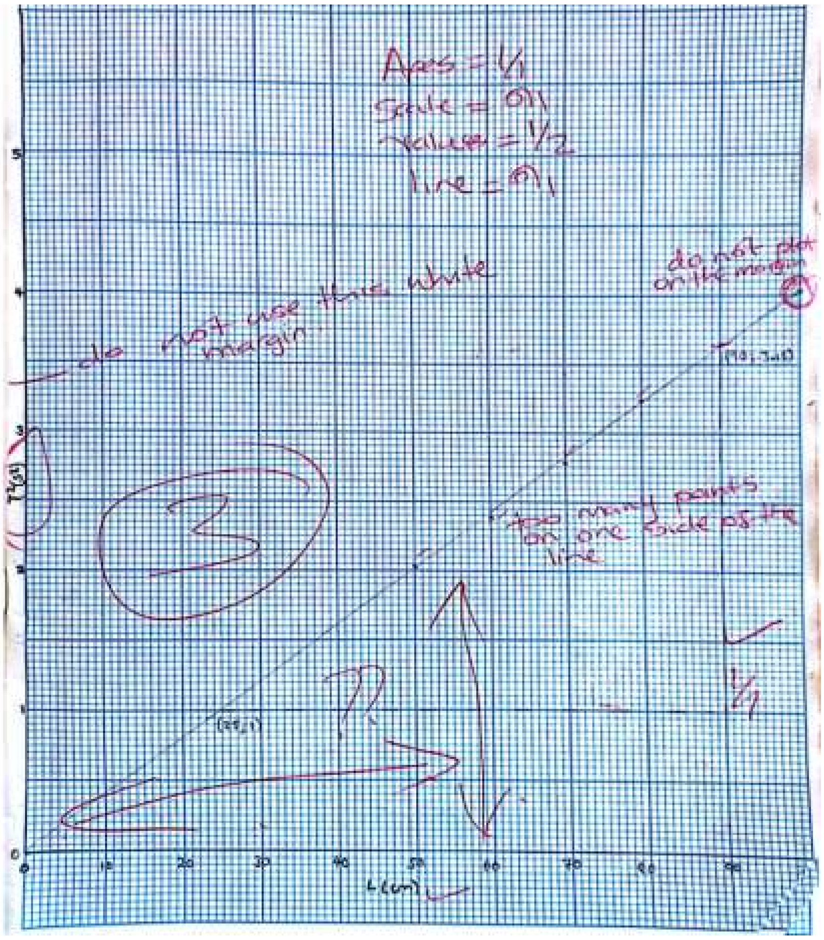
$\therefore \cancel{\ln k = -199{,}8}\qquad \cancel{k = 1{,}69\times10^{-87}}$

$\ln k = 2{,}995\qquad k = 1{,}68$ unit

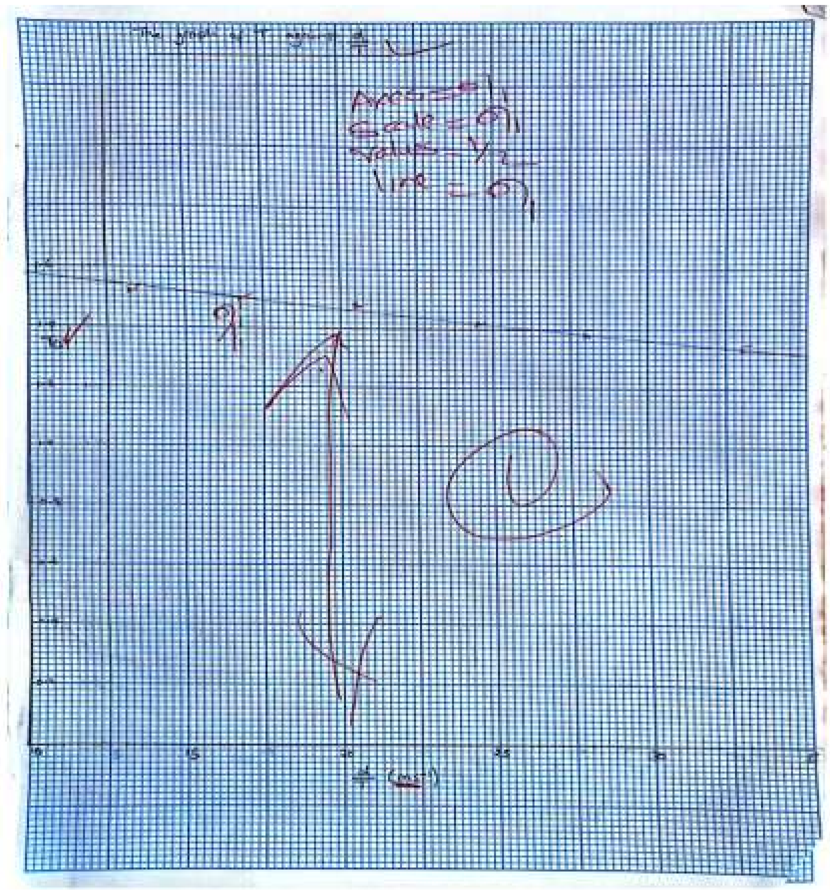
ciii) The significance of k is to make sure that the decay constant remains the same throughout the experiment.

Picture 5: Shows Work of a Student with Wrong Analysis

Picture below shows graph of a student who had an incorrect line of best fit and the other one shows graph with an inappropriate scale.



Picture 6:Shows Student work with Mistakes in Line of Best Fit



Picture 7: Show Work of a Student with Wrong Scale

Improving students' skills in these areas would be crucial for enhancing the quality and accuracy of their practical reports, as graphs are an essential part of data presentation in physics.

4.2.3: Mistakes in Designing an Experiment

Designing an experiment requires students to demonstrate their ability to plan and execute experiments independently. However, many students struggle with this component, leading to frequent mistakes. To better understand the nature and frequency of these mistakes, a detailed analysis of student responses was conducted. Table 4.3 presents the distribution of mistakes observed in the design question.

Error Type	Number of Student out of 50	Frequency (%)
Incomplete or Vague Aim	22	44
Poor Identification of Variables	28	56
Insufficient or Unrealistic Equipment List	27	54
Poor Experimental Procedure	31	62
Incomplete or Incorrect Data Collection Plan	26	52
Failure to consider Data Analysis	35	70
Poor Safety Considerations	32	64
Lack of Clarity and Organisation	37	74

Table 4.2.3: Mistakes in Designing an Experiment

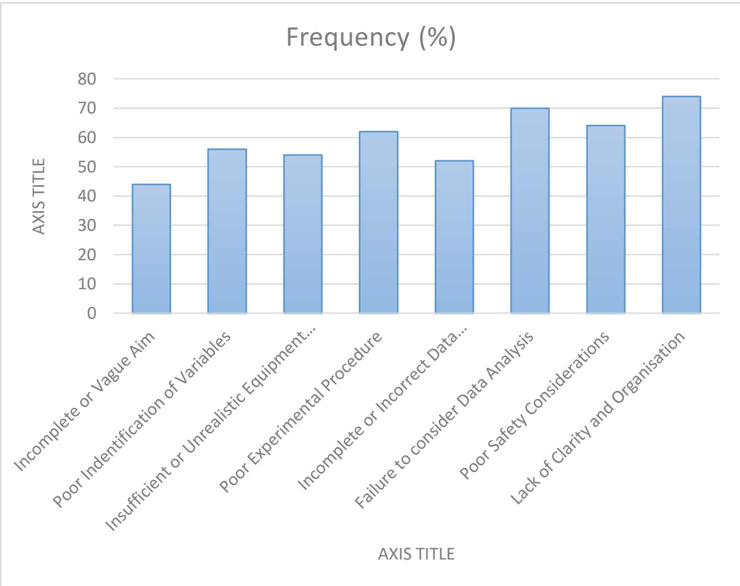
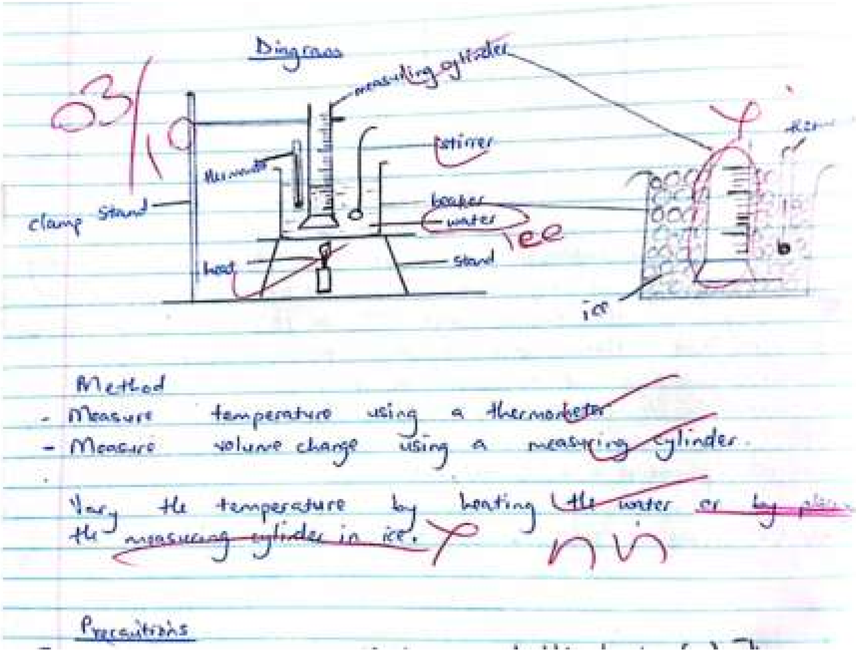
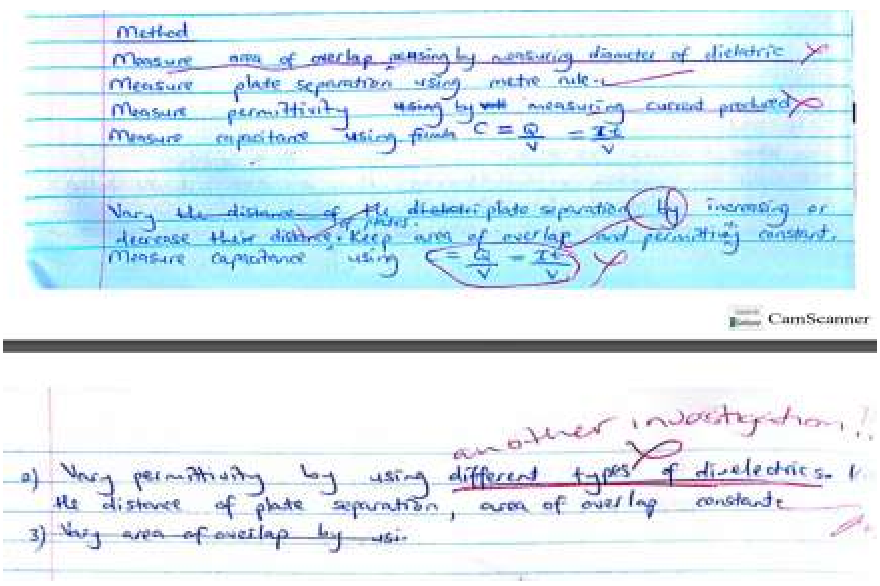


Fig 4.2.3: Bar Graph Showing Mistakes in Designing an Experiment

The findings show that the majority of students struggle with multiple aspects of the design question, from planning and organizing experiments to addressing safety and data analysis. Notably Mistakes related to clarity and organization and data analysis are the most prominent, indicating areas where targeted teaching interventions are necessary. Safety considerations and experimental procedure also need significant attention, given their high frequency. Picture below shows work of a student with incomplete method in designing an experiment and the other one shows work with wrong method prescribed.

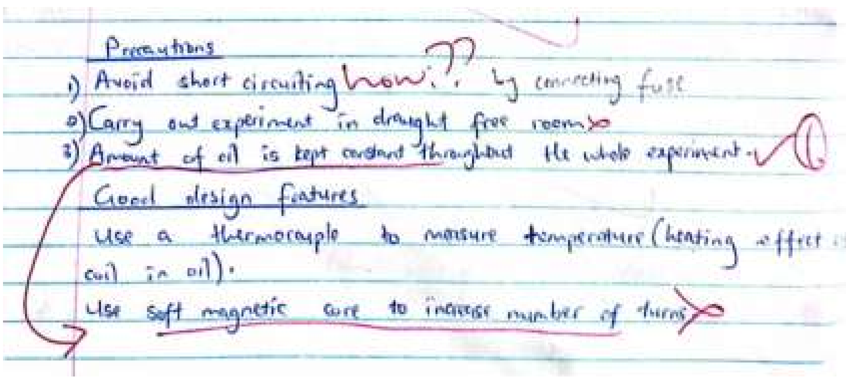


Picture 8: Shows work of a Student with incomplete Method



Picture 9: Shows Work of a Student with Wrong Method

Picture below shows work of a student with poor safety considerations.



Picture 10: Shows Work of a Student with Poor Safety Considerations

4.3 CAUSES OF MISTAKES IN PRACTICAL REPORT WRITING

Identifying the causes of mistakes in practical report writing is essential for addressing the challenges faced by Advanced Level Physics students. By analyzing the frequency of these causes, the study aims to uncover underlying issues that hinder students' ability to produce accurate and meaningful reports. Table 4.6 presents the categorized causes of mistakes and their corresponding frequencies as observed in the sampled schools.

Cause Category	Specific Cause	Frequency	Percentage (%)
Teaching-related factors	Insufficient guidance on report writing	35	70
	Limited feedback on reports	30	60
Student-related factors	Lack of understanding of concepts	40	80
	Poor time management	25	50
Resource-related factors	Limited access to apparatus	20	40
	Overcrowded lab sessions	15	30

Table 4.3: Causes of Practical Report Error Frequency

Table 4.6 highlights that student-related factors, particularly a lack of understanding of concepts (80%), are the most common causes of mistakes in practical reports. Teaching-related factors, such as insufficient guidance (70%) and limited feedback (60%), also play a significant role, underscoring the need for improved instructional strategies. Resource-related issues, such as limited access to apparatus (40%) and overcrowded labs (30%), further exacerbate these challenges. These findings suggest that both pedagogical and infrastructural interventions are necessary to reduce mistakes in practical report writing.

4.4 RELATIONSHIPS BETWEEN VARIABLES

4.4.1 Error Frequency and Laboratory Experience Relationship

The relationship between students' laboratory experience and the frequency of mistakes in practical report writing is critical to understanding how hands-on practice influences performance. By exploring this connection, the study seeks to determine whether increased laboratory exposure reduces the occurrence of mistakes. Figure 4.4.1 presents a scatter plot illustrating the relationship between students' laboratory experience (measured in hours per term) and the frequency of mistakes observed in their practical reports.

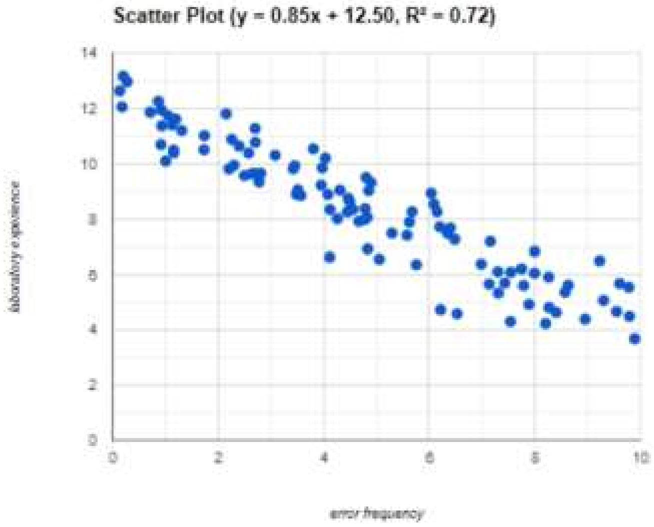


Figure 4.7: Scatter Diagram showing Mistakes Frequency and Laboratory Experience Relationship

This scatter plot shows a negative correlation between laboratory experience and error frequency, indicating that increased laboratory experience is associated with fewer mistakes.

4.4.2 Relationship Between O-level grades and Performance in Report Writing.

The relationship between students' O-level grades and their performance in practical report writing highlights the impact of foundational knowledge on advanced skills application. O-level grades serve as a reflection of students' grasp of physics concepts, which are critical for success in practical tasks. By examining this relationship, the study aims to uncover whether higher academic achievement at the O-level correlates with fewer mistakes and better performance in practical report writing at the A-level. This analysis provides valuable insights into the role of prior academic performance in shaping students' competencies in experimental analysis and reporting.

O-Level Grade	Number of Learners	Percentage (%)	Average Practical Score (%)	Performance Level
A	18	36	85	High
B	20	40	75	High
C	9	18	60	Moderate
D	3	6	50	Low

Table 1: Cross-Tabulation: Performance Levels

The majority of students with Grade A (36%) and Grade B (40%) exhibit high performance in practical report writing. Their solid theoretical foundation aids in understanding and applying concepts during experiments.

Students with Grade C (18%) perform moderately, with an average score of 60%, likely due to weaker grasp of physics concepts and skills. Those with Grade D (6%) show low performance, with an average score of 50%. These students may face significant challenges in areas like data analysis and error identification.

4.4.3 Relationship Between Teaching experience and student performance.

The relationship between teaching experience and student performance in practical report writing explores how educators' expertise and years of practice influence learners' outcomes. Teaching experience often correlates with a teacher's ability to effectively deliver complex concepts, guide students through practical tasks, and provide constructive feedback on mistakes. This study examines whether students taught by more experienced teachers exhibit fewer mistakes and higher overall performance in practical report writing compared to those taught by less experienced educators. Understanding this relationship is crucial for informing teacher training and professional development programs to enhance the quality of instruction in physics practical.

Teaching Experience	Number of Teachers	Percentage of Teachers (%)	Average Student Performance (%)	Performance Level
Less than 1 Year	1	10	55	Moderate
1-5 Years	5	50	65	Moderate
6-10 Years	3	30	75	High
11+ Years	1	10	80	High

Table 4.4.3 Cross-Tabulation: Teaching Experience and Student Performance

Teachers with 6-10 years or 11+ years of experience consistently led to higher student performance in practical report writing. This suggests that seasoned educators have refined teaching methods, better error-spotting skills, and effective feedback mechanisms.

Despite representing the majority (50% of teachers), this group's students achieved only moderate performance (65% average). This indicates the need for professional development opportunities to help these teachers transition from basic to advanced teaching strategies. Students under the guidance of these teachers struggled the most (55% average performance), possibly due to the teachers' lack of familiarity with practical report expectations and effective supervision techniques.

4.5 SUGGESTED SOLUTIONS OR STRATEGIES

Addressing the challenges faced by Advanced Level Physics students in writing practical reports requires effective instructional strategies. By analyzing feedback from teachers and students, the study identified commonly suggested strategies aimed at improving practical report writing skills. Table 4.5 presents these instructional strategies alongside the frequency of their recommendations

The data was collected through structured interviews with Physics teachers and open-ended student surveys across the sampled high schools. The frequency indicates how often each strategy was mentioned by respondents, reflecting its perceived importance or effectiveness.

Instructional Strategy	Frequency (Teachers)	Frequency (Students)	Total Frequency	Percentage (%)
Provide detailed feedback on reports	15	25	40	80
Conduct regular practical sessions	12	18	30	60
Integrate practical skills in theory lessons	10	15	25	50
Use peer review for report writing	8	12	20	40
Offer workshops on data presentation skills	6	10	16	32

Table 4.5 Instructional Strategies

As shown in Table 4.1, the most frequently suggested strategy was providing detailed feedback on practical reports, with a total frequency of 40 (80%). This highlights the importance of guiding students through their mistakes to improve their skills. The following are sample audios from the interviews which were conducted on teachers.

Teacher 3.MP3   Teacher 2.MP3   Teacher 1.MP3   Teacher 4.ogg

Regular practical sessions (60%) and integrating practical skills into theory lessons (50%) were also frequently mentioned, underscoring the need for hands-on learning. Strategies such as peer review (40%) and workshops on data presentation skills (32%) were less frequently suggested but still hold potential for enhancing students' understanding and performance. The following are the sample audios fron the interviews which were conducted on students.

Student 5.mpeg   student 4.mpeg   Student 3.mpeg   Student 2.mpeg   Student 1.mpeg

4.6 INTERPRETATION OF FINDINGS

The demographic data reveals insights into the background of both students and teachers involved in the study. A significant proportion of teachers have 1-5 years of experience (50%), indicating that many are relatively new to the teaching profession. This may influence the quality of instruction and feedback provided to students on practical report writing. Only 10% have over 11 years of experience, which suggests limited exposure to seasoned mentors in teaching practical skills.

On Students' O-Level Performance, the majority of students scored grades A (36%) and B (40%), indicating a strong foundational understanding of physics. However, students with lower grades (C: 18%, D: 6%) may struggle more with the complexities of practical work and report writing.

The findings highlight recurring mistakes students make. These mistakes are categorized into three areas which are Data Presentation in Tables, Graph Presentation and Experiment Design

In Data Presentation in Tables, mistakes such as failing to indicate uncertainties (72%) and incorrect heading and labelling (60%) were prominent. This suggests a lack of emphasis on precision and clarity in student training. Mistakes like poor organization of data (34%) and inadequate precision (56%) reflect gaps in understanding proper experimental protocols.

In Graph Presentation Mistakes, ignoring uncertainties (68%) and incomplete graph analysis (66%) indicate a weak grasp of error analysis and its importance in physics experiments. Mistakes in gradient calculations (58%) and misinterpreting graphical trends (48%) point to difficulties in applying mathematical concepts to graphical data.

In Experimental design, the most common mistakes included lack of clarity and organization (74%) and failure to consider data analysis (70%). This reflects a deficiency in both planning and critical thinking skills when approaching experimental design tasks. Mistakes such as poor identification of variables (56%) and insufficient equipment lists (54%) suggest that students may not fully understand the requirements of designing experiments.

The causes of these mistakes can be grouped into three categories, which are Student-Related Causes, Teacher-Related Causes, and Systemic/Environmental Causes

Student-related causes are limited exposure to practical due to insufficient laboratory sessions, lack of practice in applying theoretical knowledge to experimental context and anxiety or lack of confidence, especially among lower-performing students.

Teacher-related causes are inadequate feedback on student practical reports, especially from less experienced teachers (50% with 1-5 years), lack of emphasis on teaching critical aspects like error analysis and graph interpretation, also insufficient scaffolding of complex skills such as designing experiments or handling uncertainties.

Systemic or environmental causes are limited access to well-equipped laboratories and modern apparatus, large class sizes reducing opportunities for individual guidance and rigid curriculums with insufficient time allocated to practical skill development.

Considering the relationship between O-level grades and practical performance, students with higher grades (A and B) exhibited fewer mistakes, while those with lower grades (C and D) were more prone to mistakes in all areas. This correlation suggests that foundational knowledge impacts practical performance.

On teacher experience and error frequency, students taught by teachers with less than 5 years of experience seemed to have a higher frequency of mistakes, indicating the potential need for targeted professional development for newer teachers.

From the data, strategies like frequent practice sessions, explicit teaching of error analysis, and the use of rubrics were recommended by stakeholders. These strategies aim to address gaps in both teaching and learning processes, ensuring students have the skills needed to produce meaningful practical reports.

4.7 OVERVIEW OF THE CHAPTER

The results of this study shed light on the mistakes A-level physics students make while composing practical reports The findings demonstrate that while students generally have a good foundational knowledge, challenges persist in their practical skills, especially in areas requiring precision, critical thinking, and organization. Teacher experience, instructional methods, and systemic factors all contribute to these challenges. Addressing these issues holistically through targeted interventions, professional development, and improved resources is key to enhancing student performance in practical report writing.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 INTRODUCTION

As the study's conclusion, this final chapter summarizes the main conclusions and their implications while providing practical suggestions. The study's key findings are summarized at the beginning of this chapter, along with an analysis of how the research questions and objectives were met. After that, it highlights the important problems and trends found by concluding the data analysis in the previous chapter. The chapter also discusses the findings' ramifications for curriculum developers, educators, and legislators, emphasizing how they relate to enhancing advanced physics students' ability to write practical reports. Strategies to improve teaching methods, student learning, and assessment techniques are the main emphasis of the recommendations made to address the issues that have been discovered. Additionally, the chapter discusses the study's limitations and suggests areas for future research to build upon the insights gained.

5.1 SUMMARY OF FINDINGS

The study looked into the typical mistakes made by advanced physics students in Harare high schools when composing practical reports, as well as the root causes and possible fixes. The following is a summary of the main findings:

5.1.1 Common Mistakes in Practical Report Writing:

- Students commonly committed mistakes, including poorly worded experimental protocols, inadequate equipment lists, incomplete goals, and poor variable identification.
- Missing or incorrect units, inconsistent significant figures, omitting uncertainties, and ill-organized data in tables were among the mistakes in data presentation
- Plotting mistakes, inaccurate axis labeling and scaling, incorrect gradient and intercept calculations, and a failure to account for uncertainties were among the many graph-related problems that were common.

5.1.2 Underlying Causes of Mistakes:

- **Student-Related Factors**: Lack of grasp of scientific concepts, attention to detail, and weak analytical skills were recognized as major causes.
- **Teacher-Related Factors**: Limited teacher experience, a lack of emphasis on practical skills, and insufficient feedback all had a major impact on student performance.
- **Resource-Related Factors**: Inadequate laboratory facilities, antiquated equipment, and limited practice opportunities restricted students' ability to learn practical skills.

A positive correlation was observed between O-level grades and performance in practical report writing, with students achieving higher grades at O-level showing better performance in advanced-level practicals.

Teaching experience was positively correlated with student performance, with students taught by more experienced teachers achieving better results in practical report writing.

5.2 CONCLUSIONS OF THE STUDY

The study concludes that practical report writing in advanced-level physics remains a significant challenge for students in high schools in Harare. The analysis revealed a range of common mistakes across various aspects of practical report writing, including data presentation, graphing, and answering design questions. These mistakes were often linked to insufficient mastery of fundamental skills, gaps in conceptual understanding, and lack of attention to detail.

The research established that both student-related and teacher-related factors contribute to these challenges. Students' lack of analytical skills, poor grasp of experimental procedures, and inadequate practice were compounded by teachers' limited focus on practical skills, insufficient feedback, and, in some cases, lack of experience in teaching advanced-level physics. Additionally, inadequate laboratory resources further hindered effective learning and teaching of practical report writing.

A positive correlation was observed between O-level grades and performance in practical report writing, indicating that strong foundational knowledge is critical for success in advanced-level practicals. Similarly, teaching experience was found to significantly influence student performance, with experienced teachers fostering better outcomes in practical skills development.

The study highlights the importance of structured instructional strategies, professional development for teachers, and enhanced resource allocation to improve students' proficiency in practical report writing. Addressing these issues is essential to equip students with the scientific and analytical skills necessary for academic and professional success in physics.

5.3 IMPLICATIONS OF THE STUDY

The findings of this study have significant implications for students, teachers, curriculum developers, and policymakers, emphasizing the need for targeted interventions to improve practical report writing in advanced-level physics.

For Students:

The study underscores the need for students to strengthen their foundational knowledge in physics concepts and develop analytical skills to address mistakes in data presentation, graphing, and design questions.

Increased hands-on practice and structured feedback are essential for students to build confidence and competence in practical report writing.

For Teachers:

Teachers need to emphasize the importance of practical skills alongside theoretical instruction, ensuring that students understand the link between experimental work and scientific concepts.

The positive correlation between teaching experience and student performance highlights the importance of professional development programs, mentorship for less experienced teachers, and continuous learning opportunities.

For Curriculum Developers:

The curriculum should place greater emphasis on practical report writing, integrating specific objectives that address common mistakes identified in this study.

The inclusion of structured templates for data presentation, graphing, and experimental design can help standardize and improve students' reporting practices.

For Policymakers and Administrators:

Investment in laboratory resources, including modern equipment and sufficient consumables, is crucial to provide students with hands-on experience.

Policies should support regular teacher training workshops focused on practical skills and effective supervision techniques to enhance student learning outcomes.

For Future Research:

The study's findings highlight the need for further research into the effectiveness of specific instructional strategies, the role of digital tools in practical report writing, and the impact of resource availability on student performance.

Expanding the scope of similar studies to include other regions and disciplines could provide broader insights into improving practical education.

5.4 RECOMMENDATIONS OF THE STUDY

Based on the findings of the study, the following recommendations are proposed to address the challenges faced by students in practical report writing and improve their performance:

For Teachers:

Emphasize Practical Skills: Teachers should integrate regular practice sessions into their teaching schedules, focusing on data presentation, graphing techniques, and experimental design.

Provide Structured Feedback: Detailed feedback on students' practical reports should be provided, highlighting specific mistakes and offering guidance on how to correct them.

Adopt Error Analysis in Instruction: Teachers should incorporate discussions on common mistakes and their causes into lessons to improve students' awareness and understanding.

Engage in Professional Development: Teachers should attend workshops and training programs focused on practical skills, modern teaching strategies, and effective supervision techniques.

For Students:

Enhance Foundational Knowledge: Students should review and strengthen their understanding of key physics concepts and their applications in practical work.

Practice Regularly: Students should engage in consistent hands-on practice in data collection, analysis, and report writing to build confidence and competence.

Use Templates and Checklists: Structured templates for report writing and checklists for data presentation, graphing, and design questions can help minimize mistakes.

For Schools and Administrators:

Improve Laboratory Resources: Schools should ensure laboratories are adequately equipped with modern tools and materials to support effective practical work.

Organize Support Programs: Schools should offer remedial sessions or peer mentoring programs to assist students who struggle with practical report writing.

Facilitate Teacher Collaboration: Encourage collaboration among teachers to share best practices and strategies for teaching practical skills.

For Curriculum Developers:

Revise Curriculum Objectives: Incorporate specific objectives related to practical report writing, including guidelines for data presentation, graphing, and experimental design.

Include Practical Skill Assessments: Introduce practical skills assessments within the curriculum to ensure students are evaluated and trained effectively in report writing.

For Policymakers:

Support Teacher Training: Allocate resources for teacher training programs, focusing on practical instruction and supervision techniques.

Promote Continuous Professional Development: Establish mandatory professional development initiatives to ensure teachers remain updated with modern teaching methodologies.

5.5 SUGGESTIONS FOR FURTHER RESEARCH

Based on the findings and limitations of this study, the following areas are suggested for future research to deepen understanding and address unresolved issues related to practical report writing in advanced-level physics:

Broader Geographic Scope:
Conduct similar studies in other regions, both urban and rural, to examine whether the challenges identified are consistent or vary due to geographical or contextual factors.

Subject Comparison:
Investigate whether students face similar challenges in practical report writing in other science subjects, such as chemistry or biology, to identify cross-disciplinary patterns or unique issues.

Intervention Studies:
Evaluate the effectiveness of specific interventions, such as structured teaching strategies, or remedial workshops, in improving practical report writing skills.

5.6 CONCLUSION

This study has highlighted the critical challenges faced by advanced-level physics students in Harare when writing practical reports. It has provided a detailed analysis of common mistakes, their underlying causes, and their implications for students, teachers, and the broader educational system. The findings emphasize the interconnected roles of student preparedness, teacher experience, resource availability, and curriculum design in fostering or hindering success in practical report writing. The study concludes that addressing these challenges requires a holistic approach that combines improving teaching methodologies, enhancing laboratory resources, and fostering a culture of consistent practice and feedback among students. Additionally, the positive correlations between O-level performance, teaching experience, and practical report writing proficiency underscore the need for targeted support at both foundational and advanced levels. This research serves as a foundation for further investigations into effective strategies for improving science education and practical skills in physics.

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APPENDIX

Appendix A: Introductory Letter Fron Bindura University of Science Education

SAMED

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BINDURA UNIVERSITY OF SCIENCE EDUCATION

Date: 24 OCTOBER 2024

TO WHOM IT MAY CONCERN

NAME: SYOTHIATE V. JOWBE REGISTRATION NUMBER: B231242B

PROGRAMME: HBScEdPH PART: 2.2

This memo serves to confirm that the above is a bona fide student at Bindura University of Science Education in the Faculty of Science Education.

The student has to undertake research and thereafter present a Research Project in partial fulfillment of the HBScEdPH programme. The research topic is:

PRACTICALS REPORTS WRITING BY ADVANCED LEVEL PHYSICS STUDENTS: AN INVESTIGATION INTO MISTAKES OF STUDENTS IN HIGH SCHOOLS IN HARARE

In this regard, the department kindly requests your permission to allow the student to carry out his/her research in your institutions.

Your co-operation and assistance is greatly appreciated.

Thank you

BINDURA UNIVERSITY OF SCIENCE EDUCATION
DEPARTMENT OF EDUCATIONAL FOUNDATIONS
24 OCT 2024
P BAG 1020
BINDURA

Z Ndemo (Dr.)
CHAIRPERSON - SAMED

Appendix B: Student Questionnaire

Student Challenges in Physics Practical Report Writing: Survey (for students)

Dear Participant,

I am conducting a study titled *"Practical Reports Writing by Advanced Level Physics Students: An investigation into*
Mistakes of students in High Schools in Harare." The purpose of this research is to identify common errors done by students in writing practical reports, understand the underlying causes of these errors, and explore strategies to improve practical report writing skills.

Your responses will contribute to a better understanding of the factors influencing practical report writing and help in developing effective recommendations for improvement.

Please note that your participation is voluntary, and your responses will be kept confidential and used solely for academic purposes. Completing the questionnaire should take approximately 10–15 minutes.

If you have any questions or need further clarification, please do not hesitate to contact me. Thank you for your time and valuable contribution to this research.

1. What is your gender?

   Mark only one oval.

   - Male
   - Female

2. What grade did you achieve in O-Level

Mark only one oval.

- ◯ A
- ◯ B
- ◯ C
- ◯ D
- ◯ E
- ◯ U

3. How often do you do practicals ?

Mark only one oval.

- ◯ Always
- ◯ Sometimes
- ◯ Never
- ◯ Rarely

4. Which part of the report do you find most challenging?

Mark only one oval.

- ◯ Table Data Presentation
- ◯ Graph Presentation
- ◯ Analysis
- ◯ Designing an Experiment

5. What do you think are the reasons for these challenges

Tick all that apply.

- [ ] Insufficient guidance on report writing
- [ ] Limited feedback on reports
- [ ] Lack of understanding of concepts
- [ ] Poor time management
- [ ] Limited access to apparatus
- [ ] Overcrowded lab sessions

6. How do you rate the availability of laboratory equipment?

Mark only one oval.

- ( ) Excellent
- ( ) Good
- ( ) Fair
- ( ) Poor

7. What suggestions do you have for improving practical report writing in your school?

Appendix C: Teacher Questionnaire

Teacher Insights on Physics Practical Report Writing Errors: Questionnaire" (for teachers)

Dear Participant,

I am conducting a study titled "

Practical Reports Writing by Advanced Level Physics Students: An investigation into Mistakes of students in High Schools in Harare " The purpose of this research is to identify common challenges faced by students in writing practical reports, understand the underlying causes of these challenges, and explore strategies to improve practical report writing skills.

Please note that your participation is voluntary, and your responses will be kept confidential and used solely for academic purposes. Completing the questionnaire should take approximately 10–15 minutes. T

If you have any questions or need further clarification, please do not hesitate to contact me. Thank you for your time and valuable contribution to this research.

1. How many years of teaching experience do you have in Advanced Level Physics?

Mark only one oval.

- less than 1 Year
- 1-5 years
- 5-10 years
- 11 years and above

2. What is your highest qualification?

Mark only one oval.

- Diploma
- Degree
- Masters
- PHD

3. How often do you guide students in writing practical reports?

Mark only one oval.

- Always
- Sometimes
- Rarely
- Never

4. What methods do you use to teach practical report writing?

Mark only one oval.

- Lecture
- Demonstration
- Hands on Practice

5. What are the most common errors you observe in students' practical reports ?

Tick all that apply.

- [ ] Incorrect Heading and Labeling
- [ ] Inconsistent or Improper Significant Figures
- [ ] Poor Organization of Data (Intervals)
- [ ] Missing or Inappropriate Units
- [ ] Inadequate or Excessive Precision
- [ ] Failing to Indicate Uncertainties
- [ ] Recording Incorrect or Inconsistent Data
- [ ] Neglecting Derived Quantities

6. What do you think contributes to these errors?

Tick all that apply.

- [ ] Insufficient guidance on report writing
- [ ] Limited feedback on reports
- [ ] Lack of understanding of concepts
- [ ] Poor time management
- [ ] Limited access to apparatus
- [ ] Overcrowded lab sessions

7. What strategies would you recommend for improving students' practical report writing skills?

Appendix D: Document Analysis Guide

This is used to evaluate existing practical reports written by students.

NAME OF SCHOOL……………………………………..

NAME OF STUDENT……………………………………

Table Data Presentation

ITEM	Correct	Incorrect
Heading and Labeling		
Significant Figures		
Organization of Data (Intervals)		
Units		
Precision		
Uncertainties		
Recording Data		
Derived Quantities		

Graph Presentation

ITEM	Correct	Incorrect
Axis Labeling and Scaling		
Plotting of Points		
Best Fit Line		
Uncertainties		
Graph Aesthetics and Technical Details		
Gradient Calculations		
Analysis of the Graph		
Intercept Determination		
Use of graph paper		
Interpreting Graphical Trends		

Experiment Design

ITEM	Correct	Incorrect
Aim		
Identification of Variables		
Equipment List		
Experimental Procedure		
Data Collection Plan		
Data Analysis		
Safety Considerations		
Clarity and Organization		