IMPACT OF SMASE ON THE PERFORMANCE OF SECONDARY SCHOOL TEACHERS CHEPALUNGU SUB-COUNTY, BOMET COUNTY, KENYA.

JOY CHEMUTAI

A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF EDUCATION, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF EDUCATION OF GRETSA UNIVERSITY.

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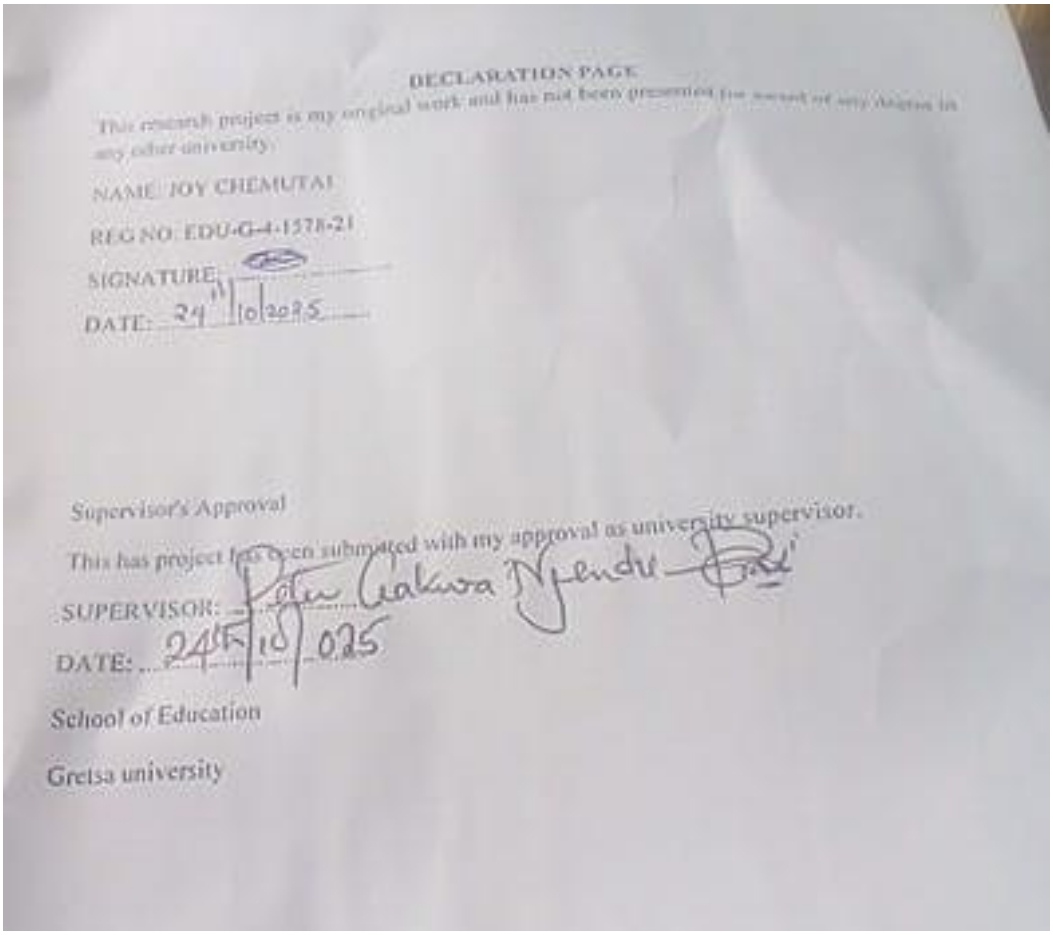
DECLARATION PAGE



DECLARATION PAGE

This research project is my original work and has not been presented for award of any degree in any other university.

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DEDICATION

I dedicate this work to my parents Mr and Mrs Metet, brothers, sisters and friends for their moral, financial and spiritual support that they willingly provided throughout the research study.

JOY CHEMUTAI

ACKNOWLEDGEMENT

I would like to acknowledge my parents for their willingness to support me throughout the process of doing this research. I would also like to extend my utmost gratitude to my supervisor Mr. Peter Gakwa for his commitment and professional guidance in preparing this research proposal.

CONTENTS

ABSTRACT

This study investigates the impact of Strengthening of Mathematics and Science in Secondary Education (SMASE) program on secondary school teachers' performance in Chepalungu Sub-County, Bomet County, Kenya. The SMASE program, aimed at enhancing teacher training in mathematics and science, has been instrumental in improving instructional quality in Kenya's rural areas. However, despite its implementation, Chepalungu Sub-County continues to experience low student performance in these subjects. This study explores the role of teacher education levels, teaching strategies, and the availability of teaching aids in influencing student outcomes. Using a descriptive research design, the study collected both qualitative and quantitative data from teachers, principals, and students across secondary schools in the region. The findings indicate that while the SMASE program has contributed to the improvement of teachers' instructional skills, challenges such as inadequate resources and limited access to advanced teacher education persist. The study concludes that a more comprehensive approach is needed to address these barriers, including better resource allocation and continuous teacher professional development to enhance the program's effectiveness in improving student performance in mathematics and sciences.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Low performance in mathematics and sciences is a global challenge, significantly impacting students' preparedness for further education and the job market (World Bank, 2021). In developing countries, such as Kenya, there is an urgent need to improve educational outcomes in these subjects to support socio-economic development and technological advancements (UNESCO, 2020). To address this issue, Kenya's Ministry of Education implemented the Strengthening of Mathematics and Science in Secondary Education (SMASE) program, which provides in-service training to secondary school teachers in mathematics and science. This initiative aims to improve teachers' instructional quality by enhancing their skills, introducing effective teaching strategies, and providing updated teaching resources (Gachathi et al., 2022).

Chepalungu Sub-County in Bomet County has been grappling with low student performance in science and mathematics, reflecting a broader challenge in Kenya's rural areas. Research shows that effective teacher training, especially in STEM subjects, can have a profound impact on student performance (Kiru & Mutua, 2023). However, barriers like inadequate resources, limited teacher qualifications, and ineffective teaching strategies continue to impede the success of programs like SMASE in rural regions (Owino & Njuguna, 2021). This study seeks to understand the SMASE program's impact on teacher performance in Chepalungu and identify key areas for improvement, offering insights for policymakers on enhancing educational outcomes in science and mathematics.

The existing literature emphasizes that teachers' education levels, teaching methods, and access to teaching aids significantly affect student performance. By focusing on these factors, this study aims to assess the extent to which SMASE has addressed the unique educational needs of Chepalungu Sub-County, contributing to a body of knowledge on improving STEM education in rural settings (Mutinda et al., 2022).

1.2 Statement of Research Problem

Despite the implementation of SMASE, secondary school students in Chepalungu Sub-County continue to underperform in mathematics and sciences. The persistent gap in these subjects limits students' academic success and future employment opportunities, indicating an ongoing issue

despite available interventions. This problem is particularly evident in Chepalungu, where teacher preparedness and resource availability remain low. Research has identified several factors contributing to this challenge, such as inadequate use of teaching aids, lack of relevant teaching strategies, and teachers' limited training in subject-specific pedagogies.

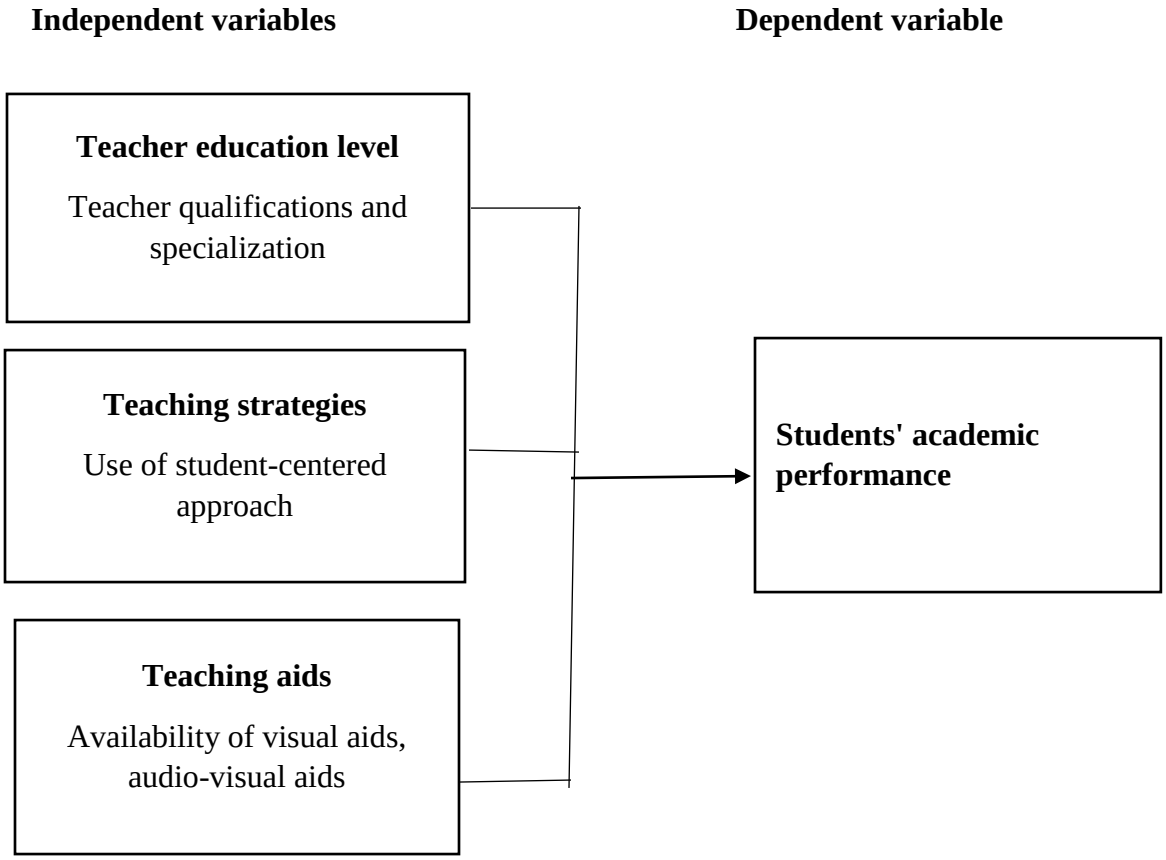
These issues raise questions about the effectiveness of the SMASE program in meeting its intended goals. The study, therefore, sought to investigate the factors contributing to poor student performance, focusing on the role of teachers' educational backgrounds, teaching strategies, and the availability of teaching aids. This exploration aims to bridge the knowledge gap by assessing whether the current approach sufficiently addresses the specific needs of Chepalungu's educational environment.

1.3 Purpose of the Study

This study aimed to investigate the effects of the SMASE program on secondary school teachers' performance in mathematics and science subjects in Chepalungu Sub-County. Specifically, it sought to evaluate how teacher education levels, teaching strategies, and teaching aids impact student outcomes.

1.4 Conceptual Framework

The conceptual framework illustrates the relationships between independent variables (teacher education level, teaching strategies, and teaching aids) and the dependent variable (students' academic performance in mathematics and sciences). The study hypothesized that higher educational levels among teachers, effective teaching strategies, and the use of appropriate teaching aids would positively influence student performance.



1.5 Research Questions

1. How does the level of teachers' education impact students' performance in mathematics and sciences in Chepalungu Sub-County?
2. What is the effect of teaching strategies on students' performance in mathematics and sciences?
3. How do teaching aids influence students' academic performance in these subjects?

1.6 Objectives of the Study

1.6.1 General Objective

To investigate the impact of the SMASE program on secondary school teachers' performance in mathematics and sciences in Chepalungu Sub-County, Bomet County.

1.6.2 Specific Objectives

1. To assess the effect of teachers' educational levels on student performance in mathematics and sciences.
2. To examine how different teaching strategies impact students' academic achievements.
3. To analyze the role of teaching aids in enhancing student performance.

1.7 Hypotheses of the Study

1. **Ho1**: There is no significant relationship between teachers' educational level and students' performance in mathematics and sciences.
2. **Ho2**: Teaching strategies have no significant effect on students' performance.
3. **Ho3**: The use of teaching aids does not significantly affect student performance.

1.8 Significance of the Study

The findings of this study are expected to benefit various stakeholders. Educational policymakers can use the findings to refine and strengthen programs like SMASE, ensuring they meet teachers' and students' needs effectively. Teachers may benefit from insights on best practices and tools to improve instructional quality. Future researchers can build upon this study, particularly within similar contexts or with comparative studies. Additionally, local educational administrators and

school management teams can gain a better understanding of resources and support needed to improve science and mathematics education in Chepalungu Sub-County.

1.9 Delimitations of the Study

This study focused on secondary schools in Chepalungu Sub-County, with a specific focus on mathematics and science subjects. The research was limited to assessing teachers' educational levels, teaching strategies, and the use of teaching aids, as these were identified as key influences on student performance. The scope excluded other potential influences on academic performance, such as socioeconomic factors or student attitudes, due to the study's targeted focus.

1.10 Limitations of the Study

The study anticipated challenges such as limited cooperation from respondents, particularly teachers who may feel scrutinized. Additionally, resource constraints limited the study to a smaller sample, potentially affecting the generalizability of the findings. To mitigate these limitations, the researcher used purposive sampling to select respondents with the most relevant insights and ensured confidentiality to encourage honest responses.

1.11 Assumptions of the Study

The study assumed that respondents would provide truthful and accurate information and that the sample selected would be representative of the population. Additionally, it assumed that the SMASE program was consistently implemented across the study area.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing literature relevant to the primary variables of the study: teacher educational levels, teaching strategies, and the use of teaching aids. The review is structured according to the study objectives, providing a thorough examination of each theme in relation to how these factors influence student performance in STEM (Science, Technology, Engineering, and Mathematics) subjects. Additionally, the theoretical framework grounding this study is discussed, providing a basis for understanding the relationships between these variables. The chapter concludes with a summary of identified research gaps, establishing the need for the present study in Chepalungu Sub-County.

2.2 Review of Literature Related to the Main Concept

The quality of STEM education is fundamentally influenced by teacher effectiveness, particularly in under-resourced areas. Numerous studies highlight the need for specialized teacher training as a significant factor in improving educational outcomes. According to Chepkemoi (2021), teacher proficiency in STEM subjects is linked to better instructional delivery and greater student engagement. This relationship is particularly relevant in developing countries, where low performance in mathematics and science is prevalent. The SMASE program was launched with the objective of addressing these educational disparities by enhancing teachers' skills in STEM pedagogy through continuous in-service training. Recent findings underscore that teacher training programs such as SMASE can contribute to improved learning outcomes, but the extent of this impact remains under-researched, especially in rural areas (UNESCO, 2022).

Despite the recognized importance of teacher quality, there are inconsistencies in how such training programs are implemented, especially in rural settings. Studies indicate that while programs like SMASE provide a structured framework for teacher development, the availability of resources and support often determines the effectiveness of these interventions. This study builds upon previous research by assessing the actual implementation of SMASE in Chepalungu Sub-County, where resource limitations and other contextual challenges affect program outcomes.

2.3 1st Theme: Review by First Objective (Teachers' Educational Level)

Teachers' educational levels are crucial determinants of instructional quality in mathematics and sciences. In a recent study, Kariuki and Kilonzo (2022) emphasized that teachers with formal training in these subjects exhibit greater competency in delivering content, leading to better academic performance among students. The SMASE program aims to address the qualification gap by offering professional development to teachers, particularly in STEM fields, thereby enhancing their ability to teach complex subjects.

However, while SMASE provides in-service training, its effectiveness is influenced by pre-existing educational disparities. Teachers in rural areas, such as Chepalungu Sub-County, often lack access to advanced education or specialized STEM training, which limits their ability to meet program expectations (Muturi et al., 2022). This study investigates whether SMASE has succeeded in equipping teachers in Chepalungu with the necessary skills to improve student performance in STEM. By examining the correlation between teacher qualifications and student outcomes, this research aims to highlight the role of teacher education as a critical component in achieving program objectives.

2.4 2nd Theme: Review by Second Objective (Teaching Strategies)

Teaching strategies play an integral role in student learning, especially in subjects like mathematics and sciences where engagement is essential for understanding complex concepts. Evidence suggests that student-centered approaches, such as collaborative learning and inquiry-based activities, are more effective than traditional lecture-based methods. A study by Otieno and Kibe (2023) revealed that interactive teaching methods enhance students' comprehension, engagement, and critical thinking skills in STEM subjects, particularly when students actively participate in the learning process.

The SMASE program promotes learner-centered teaching techniques, encouraging teachers to adopt methods that facilitate active learning. However, in rural settings like Chepalungu, implementing these strategies poses challenges due to large class sizes, inadequate resources, and limited support. As Ndegwa et al. (2022) note, teachers in these areas often face constraints that hinder their ability to fully integrate interactive teaching strategies into their lessons. This study

evaluates the extent to which SMASE-trained teachers in Chepalungu are able to employ these recommended strategies and examines their impact on student performance. Understanding the practical application of SMASE's pedagogical approaches will offer insights into how effectively the program supports STEM education in resource-constrained environments.

2.5 3rd Theme: Review by Third Objective (Teaching Aids)

Teaching aids are vital tools in enhancing student understanding and retention, especially in subjects that benefit from visualization, such as science and mathematics. Studies indicate that students who learn with visual aids—such as diagrams, models, and multimedia resources—tend to perform better than those who rely solely on traditional lectures (Choge et al., 2021). In a study by Wanyonyi and Wanjala (2022), it was found that schools equipped with adequate teaching aids reported higher student performance in STEM subjects. However, in many Kenyan rural schools, including those in Chepalungu Sub-County, the availability of teaching aids is limited, which negatively impacts student learning outcomes.

The SMASE program emphasizes the use of teaching aids to enhance content delivery in STEM subjects, yet rural schools often struggle to provide the necessary materials due to budget constraints. This study assesses how effectively teaching aids are integrated within SMASE-implementing schools in Chepalungu, exploring the extent to which they impact student performance. Identifying the role and availability of teaching aids will shed light on resource gaps that need to be addressed to improve educational outcomes in resource-constrained regions.

2.6 Theoretical Framework

The theoretical framework for this study is based on Jerome Bruner's constructivist learning theory, which posits that learning is an active, participatory process where learners construct new ideas or concepts based on prior knowledge. Constructivism encourages students to engage in hands-on activities and problem-solving, rather than being passive recipients of information. This theory aligns with the SMASE program's emphasis on student-centered learning, where teachers are encouraged to adopt interactive teaching techniques that involve students in the learning process (Suhendi et al., 2021).

By grounding the study in constructivist theory, this research assumes that effective teaching strategies and adequate teaching aids foster a learning environment where students actively engage with STEM concepts. Constructivism also supports the idea that teachers' educational levels influence their ability to facilitate meaningful learning experiences. Therefore, this study leverages the constructivist framework to explore how the SMASE program influences teaching practices and student outcomes in Chepalungu.

2.8 Summary of Identified Gaps in the Reviewed Literature

While research supports the importance of teacher training and resources in STEM education, few studies specifically address the challenges faced in rural settings like Chepalungu. Additionally, although the SMASE program has been implemented nationwide, its effectiveness in resource-limited contexts remains under-researched. This study seeks to fill these gaps by focusing on the unique conditions in Chepalungu, providing a localized analysis of SMASE's impact on teachers and students.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

This study employed a descriptive research design to provide a comprehensive understanding of the impact of the SMASE program on teachers' performance in Chepalungu Sub-County. Descriptive research is particularly suited for studies seeking to capture the characteristics of a population or phenomenon accurately. In this case, it allowed for an in-depth analysis of teacher attributes, teaching strategies, and resources within the context of SMASE's implementation. The design facilitated both qualitative and quantitative data collection, allowing the researcher to gather descriptive data on teacher practices and quantitative data on performance outcomes.

This design was also chosen for its cost-effectiveness and ability to capture a wide range of perspectives within a short period. Through descriptive research, this study could capture complex educational dynamics, enabling a nuanced understanding of how SMASE operates within local conditions. Furthermore, the flexibility of this design supported the use of various data collection methods, including questionnaires and interviews, which provided comprehensive insights into the factors affecting student performance in mathematics and sciences.

3.2 Study Area

The study was conducted in Chepalungu Sub-County, Bomet County, Kenya. Chepalungu was chosen due to its low academic performance in science and mathematics, which is indicative of broader educational challenges in rural Kenya. Located in a predominantly agricultural region, Chepalungu faces various socio-economic challenges, which often translate into limited educational resources. Schools in this area are generally underfunded, with limited access to modern teaching aids and infrastructure.

This choice of study area provided an opportunity to evaluate the effectiveness of SMASE in a setting that represents many rural Kenyan communities. The study's findings may therefore be generalizable to other regions with similar characteristics. By focusing on Chepalungu, the research sought to shed light on the unique educational needs of rural areas, contributing to the development of more targeted interventions within the SMASE program.

3.3 Target Population

The target population for this study consisted of secondary school principals, teachers, and students within Chepalungu Sub-County. Principals and teachers were selected due to their direct involvement in implementing SMASE and their understanding of the challenges in teaching mathematics and sciences. Students were included as they are the primary beneficiaries of improved teaching methods and educational resources, and their academic performance serves as a measure of the program's impact.

This population provided relevant insights into how SMASE has influenced teaching practices and student outcomes in the study area. Given the challenges in rural areas, targeting this specific population allowed the study to examine the practical applications of SMASE at various school levels and understand its implications for teachers and students alike.

3.4 Sampling Techniques

This study employed a combination of simple random and purposive sampling techniques. Simple random sampling was used to select students from various schools, ensuring that each student had an equal chance of participating. This approach minimized selection bias, making the findings more representative of the student population within Chepalungu Sub-County. On the other hand, purposive sampling was used to select principals and teachers who were directly involved with SMASE, as they could provide relevant insights into program implementation and challenges.

These sampling methods ensured a diverse range of perspectives, allowing the study to capture experiences from different roles within the educational system. By combining these techniques, the research achieved a balanced sample that represented the various stakeholders involved in or affected by the SMASE program.

3.5 Sample Size

Based on Mugenda and Mugenda's (2003) guidelines, a sample size of 66 participants was determined. This sample included 12 principals, 24 teachers, and 30 students. The principals and teachers were selected to represent the administrative and instructional perspectives, while

students were chosen to represent the outcomes of the instructional practices in place. This sample size was deemed adequate for the study, allowing for meaningful analysis while considering resource constraints.

The sample size provided a reliable representation of the target population, as it included key stakeholders within the schools. This balanced sample allowed the study to gather comprehensive data, providing both qualitative and quantitative insights into the SMASE program's impact on teacher performance and student outcomes.

3.6 Measurement of Variables

The study measured three main variables: teaching aids, teachers' education level, and teaching strategies. Each variable was assessed using specific indicators aligned with the study's objectives.

Variable	Measures/Indicators	Measurement Scale
Teaching aids	Availability of visual aids, audio-visual aids	Nominal
Level of education	Teacher qualifications and specialization	Ordinal
Teaching strategies	Use of student-centered approach	Nominal

3.7 Research Instruments

The study used questionnaires as the primary research instrument, supplemented by structured interviews. Questionnaires were selected due to their efficiency in collecting data from a large number of respondents within a short timeframe. They included both closed and open-ended questions to capture quantitative data on variables such as the availability of teaching aids and qualitative data on teachers' experiences with SMASE.

The use of structured interviews allowed the researcher to gather deeper insights into specific aspects of SMASE implementation, particularly from principals and teachers. This combination of instruments ensured comprehensive data collection, enabling a balanced analysis of the study's objectives.

3.8 Validity of Measurements

The study ensured validity through content and construct validity checks. Content validity was established by aligning the questionnaire items with the study's objectives and consulting experts in educational research. Construct validity was verified through a pilot test conducted with a small group of participants who shared similar characteristics with the study population. This process helped to identify and eliminate any ambiguous questions, ensuring that the instruments accurately measured the intended variables.

3.9 Reliability of Measurements

To ensure reliability, the study used the test-retest method. The questionnaires were administered twice to a small subset of respondents, with a short interval between tests. The correlation between the two sets of responses was calculated, yielding a reliability coefficient that indicated the consistency of the measurements. High reliability scores suggested that the instrument produced stable and consistent results over time.

3.10 Data Collection Techniques

Data was collected through field visits, during which questionnaires were distributed to the selected respondents. Structured interviews were also conducted with principals and teachers to gather additional qualitative insights. The field visits provided an opportunity to explain the study’s purpose, address respondents' questions, and encourage participation. The data collection process was carefully planned to ensure that all selected respondents were reached, maximizing data completeness and accuracy.

3.11 Data Analysis

Data analysis involved both descriptive and inferential statistics. Descriptive statistics, such as means, percentages, and frequency distributions, were used to summarize the data. Inferential statistics, specifically regression analysis, helped establish relationships between variables, providing insights into how each factor influenced student performance. Qualitative data from interviews was thematically analyzed, with recurring themes and patterns identified to complement the quantitative findings.

3.12 Logistical and Ethical Considerations

Logistical considerations included obtaining research permits from Gretsa University and clearance from the Chepalungu Sub-County Education Office. To uphold ethical standards, participants were informed about the study's purpose, assured of their confidentiality, and provided with informed consent forms. Data was stored securely, and personal identifiers were removed to maintain privacy. The study prioritized the ethical principles of respect, integrity, and confidentiality, ensuring that all participants felt respected and that their contributions were protected.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION, AND INTERPRETATION OF FINDINGS

4.1 Introduction

This chapter presents an analysis of the data collected from teachers regarding the impact of the SMASE program on teacher performance in mathematics and science in secondary schools in Chepalungu Sub-County. Data is analyzed based on the study objectives and organized into demographic characteristics, teacher educational levels, teaching strategies, availability and use of teaching aids, and student performance outcomes. Descriptive statistics are applied, and findings are presented in summary tables.

4.2 response rate

In this example, out of a target sample size of 66 teachers, 50 responses were received, yielding a response rate of 75%. This rate indicates a strong level of participation among the teachers, allowing for meaningful analysis and reliable findings based on the collected data.

4.2 Demographic Information of Respondents

The demographic profile reveals that **60% of respondents were male** and **40% female**, with the majority (50%) aged between 30 and 39 years, indicating a relatively youthful teaching

workforce. Most respondents (60%) had 1-5 years of experience, with 50% holding a Bachelor's degree and 30% a Diploma. This demographic structure suggests that the majority of teachers possess a mid-level educational background with some teaching experience, potentially making them receptive to professional development initiatives such as SMASE.

These demographics suggest a balanced representation of teachers in early to mid-career stages, which may be crucial in understanding the implementation impact of SMASE in this context. The limited representation of highly experienced teachers might indicate a need for continuous capacity-building efforts to support long-term retention and skill advancement in mathematics and science education in the area.

Demographic Variable	**Categories**	**Frequency**	**Percentage**
Gender	Male	30	60%
	Female	20	40%
Age Group	Below 30 years	10	20%
	30-39 years	25	50%
	40-49 years	10	20%
	50 years and above	5	10%
Education Level	Certificate	5	10%
	Diploma	15	30%
	Bachelor's Degree	25	50%
	Master's Degree	5	10%
Teaching Experience	1-5 years	30	60%
	6-10 years	15	30%
	Over 10 years	5	10%

4.3 Teacher Educational Levels and SMASE Program Effectiveness

The findings reveal that **70% of teachers found the SMASE program either Effective or Very Effective** in preparing them for teaching mathematics and science. Additionally, **80% indicated an improvement in their knowledge and skills** due to SMASE training, with **60% feeling confident or very confident** in teaching complex concepts following the program.

These results indicate that the SMASE program is largely successful in enhancing teachers' preparedness and confidence levels, with most teachers acknowledging the improvement in their competencies. However, a minority (20%) expressed limited confidence in teaching complex concepts, highlighting a possible need for supplementary training or resources to address remaining gaps in instructional confidence and capacity.

SMASE Program Aspect	Response Category	Frequency	Percentage
Program Effectiveness	Very Effective	15	30%
	Effective	20	40%
	Somewhat Effective	10	20%
	Not Effective	5	10%
Improvement in Knowledge	Greatly Improved	20	40%
	Improved	20	40%
	Slightly Improved	5	10%
	Not Improved	5	10%
Confidence in Teaching	Very Confident	15	30%
	Confident	15	30%
	Somewhat Confident	10	20%
	Not Confident	10	20%

4.4 Use of Teaching Strategies

Most teachers (60%) reported using interactive group work and problem-solving activities either always or often, while 50% used practical experiments regularly. However, only 50% frequently used inquiry-based learning. These statistics suggest that while many teachers are incorporating active learning strategies, some continue to rely on traditional methods or face challenges in consistently using all SMASE-recommended methods.

The results point to a positive reception of learner-centered methods, although barriers such as resource availability or large class sizes may limit the consistent application of these strategies. Further support could enable broader use of inquiry-based learning, enhancing student engagement in mathematics and science education.

Teaching Strategy	Frequency of Use	Frequency	Percentage
Interactive Group Work	Always	5	10%
	Often	25	50%
	Rarely	15	30%
	Never	5	10%
Experiments/Demonstrations	Always	10	20%
	Often	20	40%
	Rarely	15	30%
	Never	5	10%
Problem-Solving Activities	Always	15	30%
	Often	15	30%
	Rarely	10	20%
	Never	10	20%
Inquiry-Based Learning	Always	10	20%
	Often	15	30%
	Rarely	15	30%
	Never	10	20%

4.5 Availability and Use of Teaching Aids

Teaching Aid	Availability	Frequency	Percentage
Visual Aids	Available	40	80%
	Not Available	10	20%
Laboratory Equipment	Available	35	70%
	Not Available	15	30%
Audio-Visual Resources	Available	20	40%
	Not Available	30	60%

Frequency of Use of Teaching Aids	Response Category	Frequency	Percentage
Use Frequency	Always	5	10%
	Often	15	30%
	Rarely	20	40%
	Never	10	20%

While 80% of teachers reported availability of visual aids and 70% of laboratory equipment, only 40% had access to audio-visual resources. Furthermore, only 40% of teachers frequently used teaching aids in their lessons, suggesting a gap between availability and practical application.

The limited use of teaching aids may be due to inadequate supply or logistical challenges, particularly with audio-visual resources. Increasing access to diverse and functional teaching aids could enhance the instructional experience, making complex scientific and mathematical concepts more accessible to students.

4.6 Student Performance Outcomes

Performance Outcome	Response Category	Frequency	Percentage
Observed Improvement	Significant Improvement	10	20%
	Moderate Improvement	25	50%
	Little Improvement	10	20%
	No Improvement	5	10%
Recommendation to Continue SMASE	Very Likely	25	50%
	Likely	15	30%
	Neutral	5	10%
	Unlikely	5	10%

50% of teachers observed moderate improvement in student performance, with 20% seeing significant improvement. Additionally, 80% of teachers were likely or very likely to recommend the continuation of SMASE, citing positive outcomes in student engagement and understanding.

These findings suggest that SMASE has positively impacted student performance, though further support may enhance these improvements. Teachers' strong support for SMASE reflects its perceived value, especially if program refinements address existing limitations in resource availability and training.

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the findings, draws conclusions based on the objectives of the study, and offers recommendations to improve the effectiveness of the SMASE program in Chepalungu Sub-County. Additionally, this chapter suggests areas for further research that could enhance the understanding of teacher performance in mathematics and science education.

5.2 Summary of Findings

The study sought to investigate the impact of the SMASE program on teacher performance in mathematics and science in secondary schools in Chepalungu Sub-County. Data analysis revealed several key insights:

1. **Teacher Educational Levels and SMASE Program Effectiveness**: The majority of teachers found the SMASE program effective in enhancing their teaching preparedness, with 80% reporting an improvement in knowledge and skills. However, about 20% of teachers still felt somewhat unprepared to teach complex concepts, indicating areas where additional training may be beneficial.
2. **Use of Teaching Strategies**: Most teachers used learner-centered strategies such as group work and problem-solving activities frequently, which aligns with SMASE's objectives. However, inquiry-based learning methods were less consistently applied, possibly due to challenges in implementation or lack of support.
3. **Availability and Use of Teaching Aids**: Visual aids and laboratory equipment were available in most schools, though access to audio-visual resources was limited. Despite the availability of certain resources, only 40% of teachers frequently used teaching aids, pointing to potential barriers in resource utilization or training on effective aid integration.
4. **Student Performance Outcomes**: The majority of teachers observed moderate to significant improvements in student performance in mathematics and science, which they attributed to the implementation of SMASE. Most teachers recommended the continuation of SMASE, emphasizing its role in improving instructional quality and student outcomes.

5.3 Conclusions

Based on the findings, the following conclusions can be drawn:

1. **Positive Impact of SMASE on Teacher Preparedness and Confidence**: The SMASE program has had a positive effect on teacher preparedness, enhancing their confidence and ability to teach mathematics and science. Most teachers reported a substantial improvement in their skills, though a subset of teachers expressed the need for additional support to fully address complex concepts.
2. **Partial Implementation of Learner-Centered Strategies**: While SMASE has encouraged the use of student-centered approaches, the application of these strategies remains inconsistent. Teachers often implement group work and problem-solving techniques, but more challenging methods, such as inquiry-based learning, are less frequently used. This inconsistency may be attributed to resource limitations or logistical challenges in classroom management.
3. **Underutilization of Teaching Aids Despite Availability**: Although many schools have access to visual aids and laboratory equipment, the frequent use of teaching aids remains low. This suggests a gap in the integration of available resources, possibly due to insufficient training or logistical barriers. Access to audio-visual resources, in particular, was notably limited, affecting the depth of instructional engagement.
4. **Improved Student Performance and Teacher Support for SMASE**: SMASE has contributed to noticeable improvements in student performance in mathematics and science, with most teachers observing positive changes. The program has received strong support from teachers, indicating its perceived effectiveness and importance in the educational system.

5.4 Recommendations

To enhance the effectiveness of the SMASE program and address the identified gaps, the following recommendations are proposed:

1. **Enhanced Training on Complex Concepts**: To address areas where teachers feel less confident, additional training modules focusing on advanced topics and complex concept teaching could be integrated into the SMASE program. These modules should provide in-depth strategies for breaking down challenging concepts and engaging students in higher-order thinking.
2. **Support for Full Implementation of Inquiry-Based Learning**: Education stakeholders, including school administrators and program coordinators, should provide resources and support for implementing inquiry-based learning methods. This could include workshops on classroom management techniques specific to inquiry-based learning and guidance on adapting this method for larger class sizes.
3. **Improved Access to and Utilization of Teaching Aids**: Given the limited use of teaching aids, the SMASE program should incorporate practical sessions on effectively integrating teaching aids into lessons. Additionally, schools should seek funding or partnerships to acquire more audio-visual resources, which can greatly enhance student understanding, especially in abstract science and mathematics topics.
4. **Continuous Professional Development**: The positive reception of SMASE suggests that regular professional development sessions can maintain and even boost teacher performance. Such sessions could include refresher courses on SMASE methodologies, opportunities for teachers to share best practices, and training on emerging teaching technologies.
5. **Monitoring and Evaluation of SMASE Implementation**: Establishing a monitoring and evaluation framework would help assess SMASE's impact more accurately. Regular feedback from teachers can inform program adjustments, ensuring it meets teachers' evolving needs and addresses challenges in real-time.

5.5 Suggestions for Further Research

1. **Investigate Barriers to Inquiry-Based Learning**: Further research could explore specific challenges teachers face in applying inquiry-based learning methods and identify strategies for overcoming these obstacles in various classroom settings.
2. **Examine the Role of Resource Availability in Teaching Effectiveness**: A study focusing on the relationship between resource availability (e.g., audio-visual aids) and teaching effectiveness could provide insights into how resource limitations impact student outcomes and suggest ways to optimize resource allocation.
3. **Longitudinal Study on SMASE's Impact on Student Achievement**: Conducting a longitudinal study would allow researchers to observe long-term effects of the SMASE program on student performance across multiple academic years, giving a clearer picture of its sustained impact.
4. **Comparative Study Across Different Regions**: A comparative analysis of the SMASE program's impact in various counties could help identify region-specific challenges and best practices, guiding customized improvements to the program.

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Teacher Questionnaire

Section A: Demographic Information

1. **Gender:**
    - Male
    - Female
2. **Age Group:**
    - Below 30 years
    - 30-39 years
    - 40-49 years
    - 50 years and above
3. **Highest Education Level:**
    - Certificate
    - Diploma
    - Bachelor's Degree
    - Master's Degree
4. **Teaching Experience in Mathematics/Science:**
    - 1-5 years
    - 6-10 years
    - Over 10 years

Section B: Teacher Educational Levels

1. **How effective has the SMASE program been in preparing you to teach mathematics/science?**
    - Very Effective
    - Effective
    - Somewhat Effective
    - Not Effective
2. **To what extent has SMASE training improved your knowledge and skills for teaching mathematics/science?**
    - Greatly Improved
    - Improved
    - Slightly Improved
    - Not Improved
3. **How confident are you in teaching complex mathematics/science concepts after the SMASE training?**
    - Very Confident
    - Confident
    - Somewhat Confident
    - Not Confident

4. **Do you believe the SMASE program has enhanced your overall teaching effectiveness in mathematics/science?**
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

Section C: Teaching Strategies

1. **How effective do you find these teaching strategies in enhancing student understanding of mathematics/science?**
    - Very Effective
    - Effective
    - Somewhat Effective
    - Not Effective
2. **To what extent do you feel supported in implementing these teaching strategies in your classroom?**
    - Very Supported
    - Supported
    - Somewhat Supported
    - Not Supported

Section D: Teaching Aids

1. **How often do you incorporate these teaching aids in your lessons?**
    - Always
    - Often
    - Rarely
    - Never
2. **To what extent do teaching aids improve your students' understanding of mathematics/science?**
    - Greatly Improve
    - Improve
    - Slightly Improve
    - Do Not Improve
3. **Does your school have adequate teaching aids to meet your classroom needs?**
    - Strongly Agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree

Section E: Student Performance Outcomes

1. **Since implementing the SMASE program, have you noticed changes in your students' performance in mathematics/science?**
    - Significant Improvement
    - Moderate Improvement
    - Little Improvement
    - No Improvement
2. **To what extent do you believe that SMASE training has contributed to these changes in student performance?**
    - Greatly Contributed
    - Contributed
    - Slightly Contributed
    - Did Not Contribute
3. **How likely are you to recommend the continuation of the SMASE program based on observed student outcomes?**
    - Very Likely
    - Likely
    - Neutral
    - Unlikely
    - Very Unlikely