

**ROLE OF SCIENCE TECHNOLOGY ENGINEERING AND MATHEMATICS (STEM)  
ON ACADEMIC PERFORMANCE OF STUDENTS IN JAMHURI JUNIOR  
SECONDARY SCHOOL IN THIKA SUB-COUNTY, KIAMBU COUNTY**

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**A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF EDUCATION IN  
PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF  
DEGREE OF BACHELOR OF EDUCATION OF GREYSON UNIVERSITY**

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## DECLARATION

This project is our personal original work and has not been presented for the award of a degree or for any similar purpose in any university.

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## **ABBREVIATIONS AND ACRONYMS**

STEM: Science Technology Engineering

BRICS: Britain Russia India China and South Africa

JSS: Junior Secondary School

NRC: National Research Council

STREAM: Science Technology Reading Engineering Arts and Mathematics

## **ABSTRACT**

This study investigated the role of Science, Technology, Engineering, and Mathematics (STEM) education in influencing the academic performance of students at Jamhuri Junior Secondary School in Thika Sub-County, Kiambu County. This topic will cover; The background of the study, Statement of the problem, purpose of the study conceptual framework, the significance of the study, literature review, research methodology and findings. The objectives of the study will be to determine how student motivation and engagement, the use of technology, modes of assessment in integrated STEM, and levels of student achievement influence academic performance. The purpose of the study was to investigate how student motivation and engagement, technology use, assessment methods, and levels of student achievement in STEM influence academic performance. The research will adopt a descriptive approach. The target population will comprise 190 students in Grades 7, 8, and 9, and 10 STEM subject teachers, therefore a target population of 200. A sample of 133 learners and 10 teachers will be selected using Yamane's formula and simple random sampling. Data will be collected using structured questionnaires and analyzed quantitatively through descriptive statistics. The study anticipates that integrated STEM education enhances student engagement, technological competence, and overall performance. The findings indicate that STEM integration enhances student motivation and improves performance when supported by access to technology and practical, collaborative assessment methods. However, unequal access to digital tools and limited teacher training were identified as persistent challenges. The study is significant in that it offers evidence-based recommendations for improving STEM delivery, including expanding access to educational technology, enhancing teacher capacity, and adopting varied, hands-on assessment approaches. By addressing these areas, schools can better equip students with the competencies needed for higher academic achievement and future careers in science and technology.

## **CHAPTER ONE: INTRODUCTION**

### **1.1 Introduction**

The chapter focused on the background of the study, statement of the problem, purpose of the study, research objectives, research questions or hypothesis, conceptual framework, significance of the study, delimitation of the study and limitations of the study.

### **1.2 Background of the Study**

Science, Technology, Engineering, and Mathematics (STEM) education is now a key component of educational systems in numerous countries worldwide, including Germany, the United States, Canada, the Netherlands, and the United Kingdom, among others. According to the World Bank (2016), analysis of the 2013 STEPS survey data revealed a significant relationship between STEM competencies and youth employment prospects in Kenya. In alignment with global trends, Kenya's Ministry of Education initiated efforts to integrate ICT into STEM instruction as early as 2006 (Ministry of Education, 2016). Further collaborations, such as the 2014 partnership between UNESCO Kenya and the Kenyan government, aimed to foster mentorship programs for secondary school girls pursuing STEM.

Across the African continent, researchers such as Mkhize (2023), Badmus and Omosewo (2020), and others have explored the evolution of STEM, STEAM (which integrates Arts), and STREAM (including Reading) education. This study have aimed on challenges faced by African women and the broader transformation of STEM curricula.

Research by Vela, Pedersen, and Baucum (2020) explored the factors influencing student enrollment in STEM programs within Technical and Vocational Education and Traini(TVET) institutions. Similarly, Miller et al. (2018) investigated the motivations behind male and female students choosing to pursue STEM disciplines in these institutions.

The BRICS nations—Brazil, Russia, India, China, and South Africa—have also prioritized improving the quality of STEM education. These countries have taken strategic steps to cultivate innovation-driven economies by fostering entrepreneurial ecosystems centered around STEM disciplines (Loyalka et al., 2021). Their experience illustrates how STEM education can serve as a driver for national development, innovation, and long-term technological advancement.

### **1.3 Statement of the Problem**

Academic performance in Science, Technology, Engineering, and Mathematics (STEM) subjects has become an area of growing concern in secondary education. Although STEM is globally recognized as a key pillar for economic development, technological advancement, and innovation, many students continue to struggle in these disciplines. In Thika Sub-county, Kiambu County, student performance in STEM-related subjects has been inconsistent, prompting critical inquiry into the factors that affect student engagement and academic success in these fields.

The core objective of STEM education is to enhance students' understanding of scientific principles while fostering essential 21st-century competencies, including critical thinking, creativity, and problem-solving. However, several obstacles—such as insufficient teaching materials, limited access to modern educational technologies, inadequate teacher preparation, and low student motivation—have impeded the successful delivery of STEM programs.

This study seeks to find out the impact of STEM education on academic performance at Jamhuri Junior Secondary School. Specifically, it will explore how elements such as technology integration assessment strategies, and student motivation influence learning outcomes. The findings of this investigation are expected to come up with solutions on how STEM education can be more effectively structured to enhance student performance and prepare better learners for future careers in science and technology.

### **1.4 Purpose of the Study**

The purpose of this study was to investigate the role of Science, Technology, Engineering, and Mathematics (STEM) in influencing academic performance at Jamhuri Junior Secondary School in Thika Sub-County, Kiambu County. Despite STEM being a global educational priority, many students continue to underperform in these subjects. The study examined how student motivation and engagement, technology use, assessment methods, and levels of student achievement in STEM impact performance. The aim was to come up with ways that would inform how STEM can be better implemented to improve educational outcomes and encourage students to choose careers in science and technology fields.

## 1.5 Conceptual Framework

### Independent Variables

### Dependent Variable

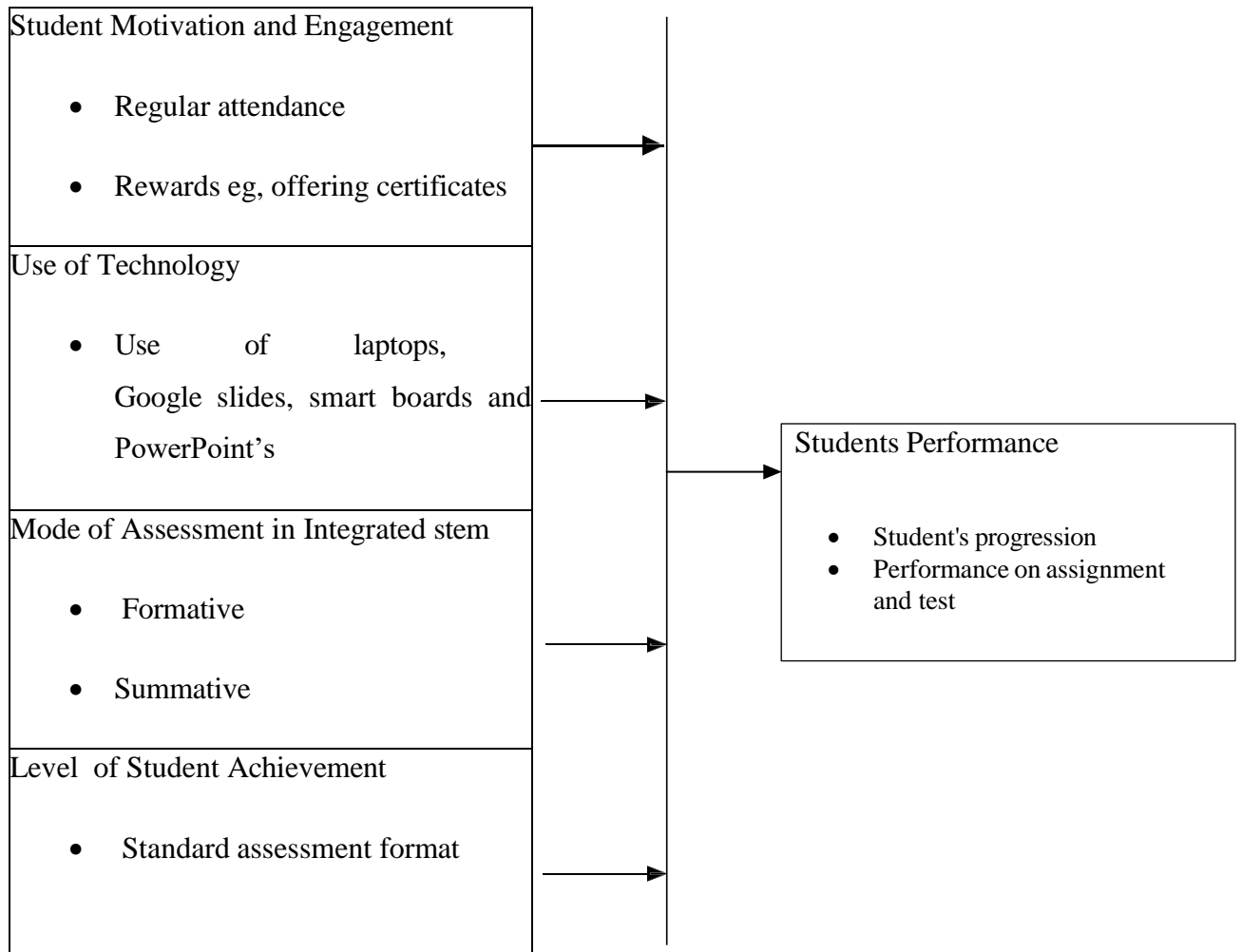


Figure 1: Conceptual framework

Source: Research Data(2025)

## 1.6 General Objectives

To find out the role of Science, Technology, Engineering and Mathematics (STEM) in enhancing Jamhuri Junior Secondary School students' performance in Thika sub-county, Kiambu County.

## **1.7 Specific Objectives**

- i. To determine how motivation and engagement contributes to good academic performance of students of Jamhuri Junior Secondary School in Thika sub-county, Kiambu County.

- ii. To evaluate how the use of technology enhances student academic performance in JSS in Thika sub-county, Kiambu County.
- iii. To examine how mode of assessment in integrated STEM influences students' academic performance of students in JSS in Thika sub-county, Kiambu County.
- iv. To find out how level of student achievement in STEM influences students' academic performance in JSS in Thika sub-county, Kiambu County.

### **1.8 Research Questions**

- i. How does motivation and engagement influence student performance in Thika sub-county, Kiambu County?
- ii. How does the use of technology affect students' performance in STEM subjects in Thika sub-county, Kiambu County?
- iii. How does mode of assessment improve student performance in Thika sub-county, Kiambu County?
- iv. How does level of student achievement in STEM influence performance of students in JSS in Thika sub-county, Kiambu County?

### **1.9. Significance of the Study**

This study is significant because it contributes to the advancement of STEM education by integrating science, technology, engineering, and mathematics in a unified learning approach. It will motivate students and improve level of student's achievement in performance of the students. The findings will also guide educators and policymakers in designing effective STEM programs that promote innovation and national development.

### **1.10 Delimitation of the Study**

The research study strictly focused on how STEM influences academic performance of Jamuhuri secondary school students and was restricted only within Thika sub-county, Kiambu County.

### **1.11 Limitations of the Study**

In the research study, at some points it became difficult for the researchers to detect some kind of false or incorrect information from respondents.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

Student performance in integrated STEM education is shaped by a dynamic interplay of various factors. This literature review focuses on four critical independent variables—student motivation and achievement, use of technology, modes of assessment in integrated STEM, and level of achievement and how they influence student performance, the dependent variable

### **2.2 Impact on Student Motivation and Engagement**

Student motivation plays a pivotal role in determining academic success, especially within STEM fields that require consistent effort and deep cognitive involvement. As outlined by Schunk, Pintrich, and Meece (2015) in *Motivation in Education: Theory, Research, and Applications*, motivation influences how learners begin, regulate, and maintain their educational behaviors. Learners who are internally motivated are generally more resilient in the face of academic challenges and tend to achieve better results. Wang et al. (2022), writing in the *Journal of STEM Education Research*, discovered that students with higher motivation levels in STEM subjects performed more effectively, largely due to their heightened participation in inquiry-driven learning experiences.

Freeman's (2019) empirical study published in the *Asia Pacific Education Review* confirmed that motivation is a significant predictor of STEM achievement across various cultural settings. Their findings emphasize the crucial link between student motivation and academic performance, particularly when educational contexts foster relevance and student agency.

### **2.3 Use of Technology**

The integration of technology into STEM education has grown substantially in recent years, fostering more interactive, tailored, and collaborative approaches to learning. A UNESCO policy report (*The Impact of Digital Technologies on Learning*, 2019) indicates that when educational technologies are thoughtfully embedded within the curriculum, they are associated with improved student outcomes.

Ifenthaler and Yau (2020), writing in the *British Journal of Educational Technology*, observed that tools such as simulations, interactive applications, and online collaboration platforms significantly improved students' conceptual grasp and academic performance in STEM disciplines. A study by Li and Ma (2018), published in the *Educational Technology Research and Development Journal*, demonstrated that learners using adaptive educational technologies showed notable gains in STEM assessments.

Technology boosts student motivation, which in turn contributes to enhanced learning. Ouyang and Jiao (2021), in an article from *Computers & Education*, found that the use of virtual reality environments and AI-based tutoring systems led to increased engagement and prolonged focus during science lessons. However, the successful implementation of technology in education is influenced by various contextual factors, including teacher expertise, the quality of infrastructure, and socio-economic disparities.

#### **2.4 Modes of Assessment in Integrated STEM**

Assessment is essential for evaluating and enhancing student learning, in capturing the dynamic and interdisciplinary nature of STEM education. Pellegrino et al. (2016), in their article in *Measurement: Interdisciplinary Research and Perspectives*, argue that effective STEM instruction calls for performance-based assessments that include critical skills such as creativity, collaboration, and problem-solving.

Honey and Hilton (2020), in their volume *Innovative Assessment in STEM Education* from the National Academies Press, highlight the value of formative and project-based evaluations. These approaches provides continuous feedback and offer students opportunities to revise and refine their work—strengthening both academic performance and self-confidence.

A comparative study by Khalaf and Zin (2021), published in the *International Journal of STEM Education*, found that students assessed through structured rubrics and formative strategies consistently outperformed those evaluated via traditional exams. Their findings suggest that assessments modeled on real-world STEM problems better equip students for complex cognitive tasks, thus improving overall academic achievement.

## **2.5 Level of Student Achievement**

A student's previous academic success is widely recognized as a strong predictor of future performance. Zimmerman and Schunk (2018), in *Self-Regulated Learning: Theories, Measures, and Outcomes*, shows that learners who have experienced consistent academic success often develop higher levels of self-efficacy, which enhances their motivation, learning strategies, and academic behaviors.

Research by Hwang and Chang (2020), published in the *International Journal of Science and Mathematics Education*, identified a clear link between prior academic performance and STEM achievement in secondary education. Their study emphasized that learners with a strong academic foundation understands and performs better STEM content.

Additionally, the concept of academic momentum, as discussed by Moore et al. (2019) in the *Review of Higher Education*, suggests that consistent academic success can create a reinforcing cycle of motivation and achievement. In the Kenyan context, Musyoka et al. (2023), writing in the *East African Journal of Education and Social Sciences*, found that students who performed well in early secondary levels tended to achieve higher scores in national STEM assessments.

## **2.6 Theoretical Framework**

The legacy of Albert Einstein remains central to the development of modern physics, yet contemporary researchers continue to reinterpret and expand upon his foundational insight. Between 2019 and 2024, Smolin has explored the microscopic structure of spacetime through discrete frameworks such as spin networks. His theories propose that spacetime may be composed of looped, granular units, offering a fresh lens through which to reconcile gravity with quantum theory—advancing Einstein’s vision while challenging classical assumptions.

Clifford M. Will, recipient of the Albert Einstein Medal in 2019 has played a pivotal role in empirically validating general relativity through post-Newtonian models, which compare Einstein's theoretical predictions with precise astrophysical observations. By studying gravitational wave signals, pulsar movements, and black hole interactions, Will has not only reinforced the accuracy of Einstein's theories but also developed analytical tools to test for possible deviations, thereby keeping general relativity responsive to new data and technological advances.

In 2020, physicist Aurélien Hees, along with the microscope satellite team, performed one of the most refined tests of the equivalence principle. The experiment tracked the behavior of test masses in orbit and confirmed, with extraordinary precision, that objects in free fall accelerate uniformly regardless of their material composition. These findings place tighter constraints on theories involving dark matter or quantum gravitational anomalies, reaffirming the robustness of Einstein's framework through advanced experimental methods.

## **2.7 Summary of Identified Gaps in the Review of Literature**

One of the gaps identified in the literature is the lack of early exposure to STEM education in elementary and middle school. Research shows that enabling access to STEM courses at an early age can significantly enhance students' STEM learning outcomes.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction.**

This chapter discussed the research methodology that will be employed. The research design, study area, target population, sample size, sampling methods, research tools, data collection methodologies, validity and reliability, data analysis, and logical reasoning are well described.

### **3.2 Research Design**

The study used a descriptive research design. As noted by Irwanto et al. (2020), STEM education has spread widely and undergone notable development in countries such as Britain, Russia, India, China, and South Africa. Scholars including Geng (2023), Hyllegard et al. (2020), and Sun et al. (2023) reference Tasha Kori's (2009) definition of research design as a comprehensive plan or strategy that directs the collection and analysis of data, while also providing a structure for interpreting the findings.

A quantitative research design was used which involved the choice of research methods, the identification of data sources, and the selection of analytical techniques aligned with the research question. He stresses that research design should be matched with the research question and must be informed by a thoughtful evaluation of the strengths and limitations of available methods and data sources. Data for this study was collected through a survey and analyzed using both descriptive and inferential statistical methods. Descriptive statistics were employed to summarize the responses and detect any emerging patterns or trends.

### **3.3 Study Area**

The study was carried out in Thika sub county, Kiambu county, Kenya. One public school was purposefully selected for several reasons. It is situated in Thika Sub-County, a region showing mixed results in STEM subject performance. The school served a diverse student population, making it ideal for analyzing socio-economic and gender-related factors in STEM education. The school was accessible to researchers and cooperative in granting research permissions, supporting ethical data collection.

### **3.4 Target Population**

According to Borg and Gall(2012),a population is a group of people who share similar traits in a situation where the goal of the study is to generalize the findings. The research targeted 190 students and 10 teachers in Jamhuri Junior Secondary School in Thika sub county, kiambu county.

### **3.5 Sampling Technique**

According to Gorospe, Donahue , and Kar l(2015),sampling enables the collection and analysis of data from a specific subset of the sample taken from the entire population with the aim of reflecting the entire population. Simple random sampling was employed to select 133 students in grade seven, eight and nine in Jamhuri Junior Secondary School.

### **3.6 Sample Size**

The total target population was 200 (190 students from grades 7, 8, and 9 and 10 teachers in STEM subjects). Using Yamane’s formula for sample size calculation with a 5% margin of error

$$n = N/(1 + N (e)^2)$$

Where; n =sample size

N=Target population

1 =constant

e =Error(0.005 or 5%)

Calculations;

$$n = 200/(1+200(0.05)^2)$$

$$n=133$$

### **3.7 Measurement of Variables**

Independent include; Student motivation and engagement, advancement in Technology, assessment in integrated STEM. Dependent variables were student performance.

**Table 1: Measurement of Variables**

<b>Variables</b>	<b>Indicators</b>	<b>Measurement Scale</b>
Student motivation and engagement	Improved performance and regular attendance	Nominal
Use of technology	Use of laptops, video shows, charts etc	Nominal
Modes of Assessment in integrated STEM	Use of project based learning	Nominal
Level of student achievement	Achievement category: Exceeding Expectations, Meeting Expectations etc	Nominal

**Source: Research Data (2025)**

### **3.8 Research Instrument**

The primary research instrument used in this study was a structured closed-ended questionnaires. It was selected because it allowed for standardized data collection making it possible to compare responses across participants and conduct statistical analysis effectively. As highlighted by recent scholars, questionnaires remain a popular and reliable data collection method in contemporary research due to their scalability, clarity, and ability to produce standardized data suitable for analysis (Taherdoost, 2016).

### **3.9 Validity of Measurement**

Validity refers to how accurately a research instrument measures the specific constructs it is intended to assess. As highlighted by Maric et al. (2023), effective assessment tools in STEM

education must satisfy multiple forms of validity namely content, construct, and criterion-related validity to produce reliable and meaningful findings. Content validity was established by designing the instrument through an extensive review of contemporary STEM literature, ensuring alignment with the research objectives and relevant theoretical foundations.

Mayes and Rittschof (2021) also stress the importance of incorporating both cognitive and affective elements into the validation process for STEM-related assessments. These include learners' problem-solving skills, critical thinking capabilities, and attitudes toward STEM subjects. Reflecting this perspective, the questionnaire used in this research was crafted with feedback from experienced educators and underwent a pilot study with a sample group of students to evaluate its clarity, relevance, and overall effectiveness.

### **3.10 Reliability of Measurement**

A system reliability is its capacity to perform consistently and precisely over time. Reliability is the assumption that any meaningful results ought to be more than a single finding and be naturally reproducible (2014) Moscalet Questionnaire and interviews were concerned with the consistency of responses to the research questions. Samples of questionnaires were given to see whether the respondents will understand.

### **3.11 Data collection Techniques**

#### **Use of Questionnaires**

This involved administering of questionnaires to various target group including the teachers and students.

### **3.12 Data Analysis**

Data collected was analyzed qualitative and quantitative. The data was first presented then presented data be analysed based on themes. Each theme was presented using descriptive analysis such as graphs, pie charts, percentages, frequency distribution tables.

### **3.13 Logical and Ethical Considerations**

The researchers borrowed permission from one public junior secondary school to be allowed to conduct the research. Ethical issues were considered. we upheld confidentiality and privacy of the data collected from respondents.

## CHAPTER FOUR: DATA PRESENTATION, AND INTERPRETATION

### 4.1 Introduction

This chapter presents the data collected from students at Jamhuri Junior Secondary School in Thika Sub-County. The aim was to understand how STEM education influences student performance, with a focus on motivation and engagement, technology use, and assessment. The data is organized in tables and graphs for clarity and is explained in simple terms to help make the findings easier to understand.

### 4.2 Response Rate

Out of the 133 questionnaires issued (123 for students and 10 for teachers), 110 were returned and correctly filled, giving a good response rate of 82.7%. This response was reliable for the study to draw conclusions.

**Table 2: Response Rate**

Category	Questionnaires issued	Questionnaires returned	Response rate
Students	123	105	85.4%
Teachers	10	5	50%
<b>Total</b>	<b>133</b>	<b>110</b>	<b>82.7%</b>

**Source: Research Data (2025)**

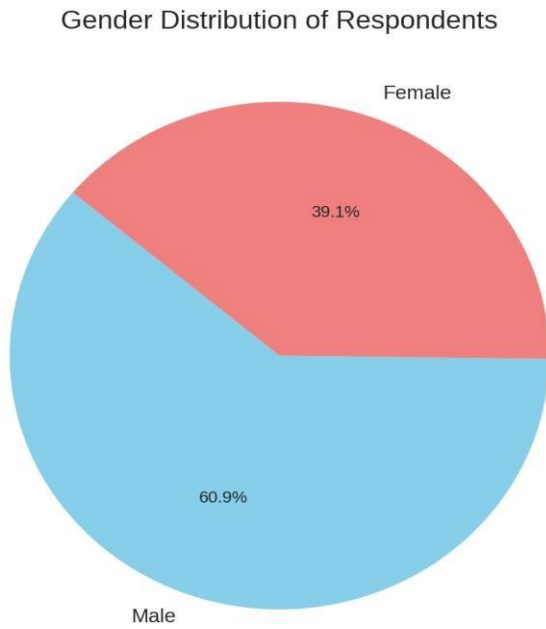
The student's response rate is 85.4% increasing the reliability of the data. However, the 50% teacher response rate shows that some limitation in representing faculty perspectives possibly due to time constraints in STEM integration topics.

### 4.3 Gender Distribution of Respondents

**Table 3: Gender Distribution of Respondents**

Gender	Frequency	Percentage
Male	67	60.9%
Female	43	39.1%
<b>Total</b>	<b>110</b>	<b>100%</b>

**Source: Research Data (2025)**



**Source: Research Data (2025)**

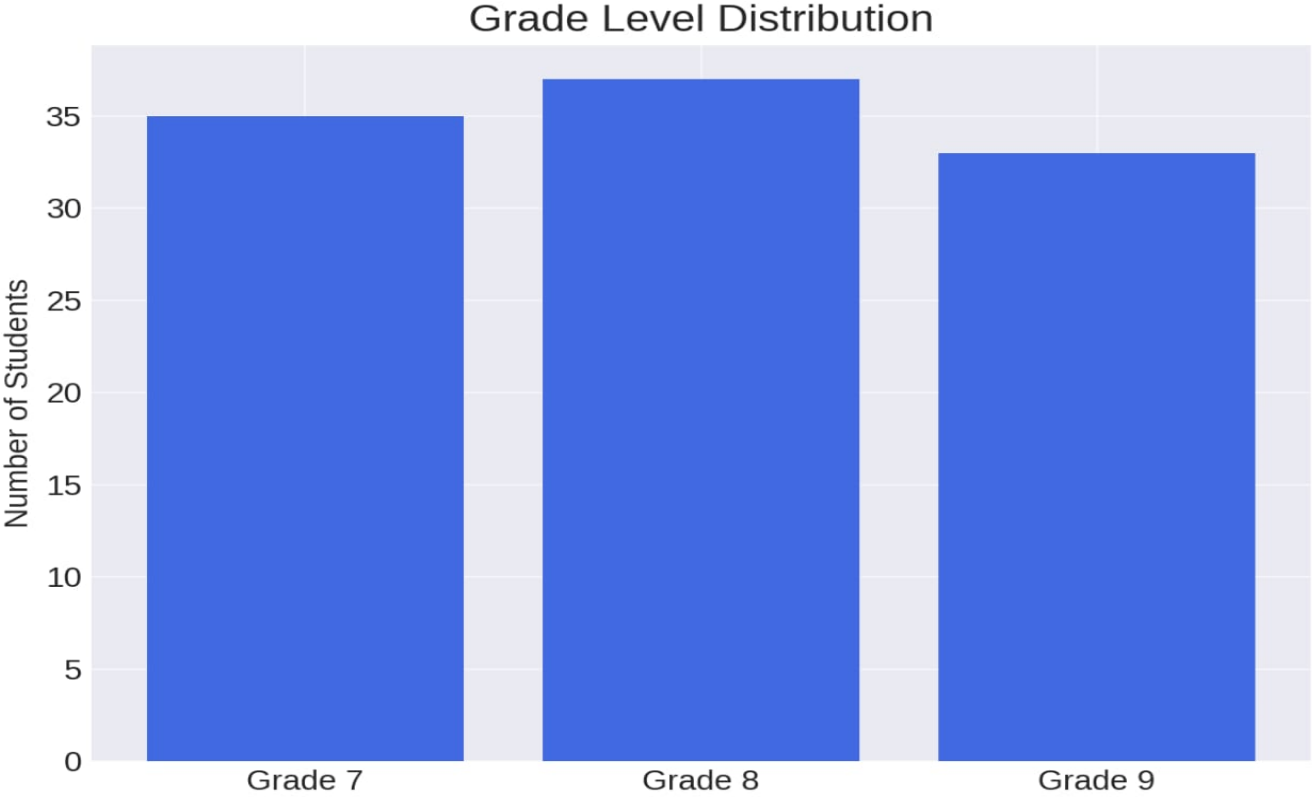
While both genders are represented, male students formed the majority of the respondents. This may suggest either gender disparity in STEM interests, access or participation and sampling bias.

### 4.4 Grade Level of the Respondents

**Table 4: Grade Level of the Students**

Grade Level	Frequency	Percentage
7	35	33.3%
8	37	35.2%
9	33	31.5%
<b>Total</b>	<b>105</b>	<b>100%</b>

Source: Research Data (2025)



Source: Research Data (2025)

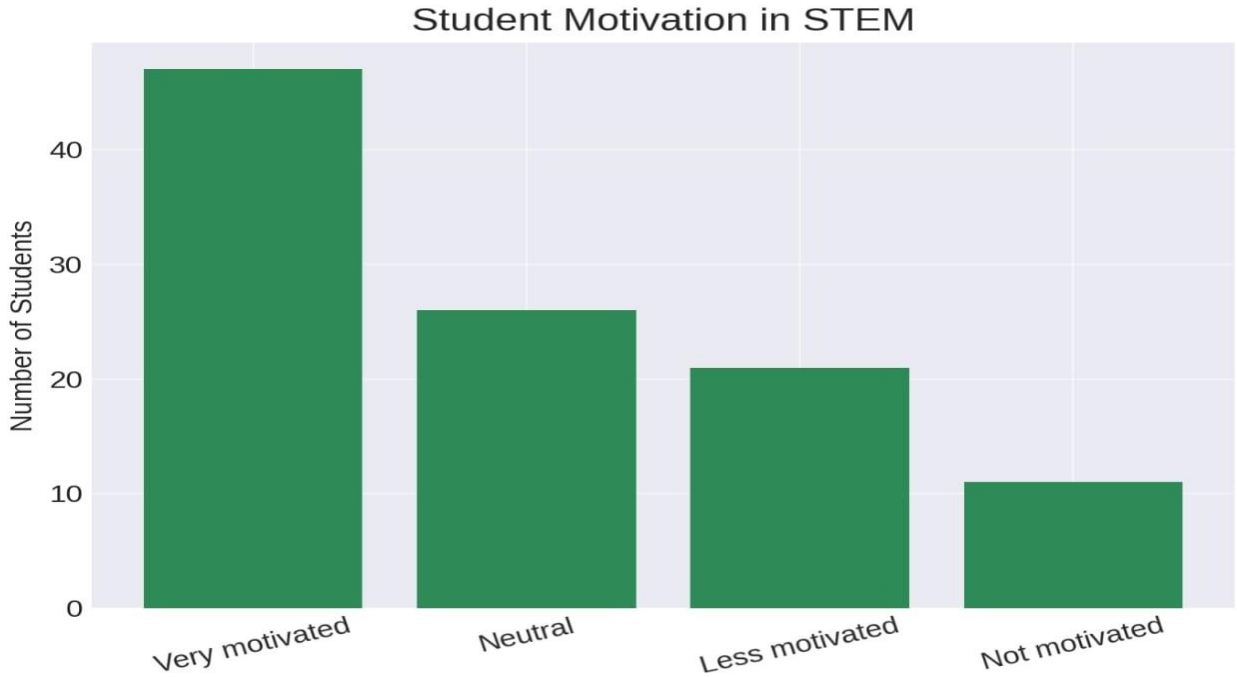
Balanced representation across grades indicates consistency in STEM engagement throughout JSS. Higher response suggests interest in STEM leading to better long term performance.

**4.5 STEM Influence on Motivation and Engagement**

**Table 5:STEM Influence on Motivation and Engagement**

Motivation Rating	Frequency	Percentage
Very motivated	47	44.8%
Neutral	26	24.7%
Less Motivated	21	20%
Not Motivated	11	10.5%
<b>Total</b>	<b>105</b>	<b>100%</b>

Source: Research Data (2025)



Source: Research Data(2025)

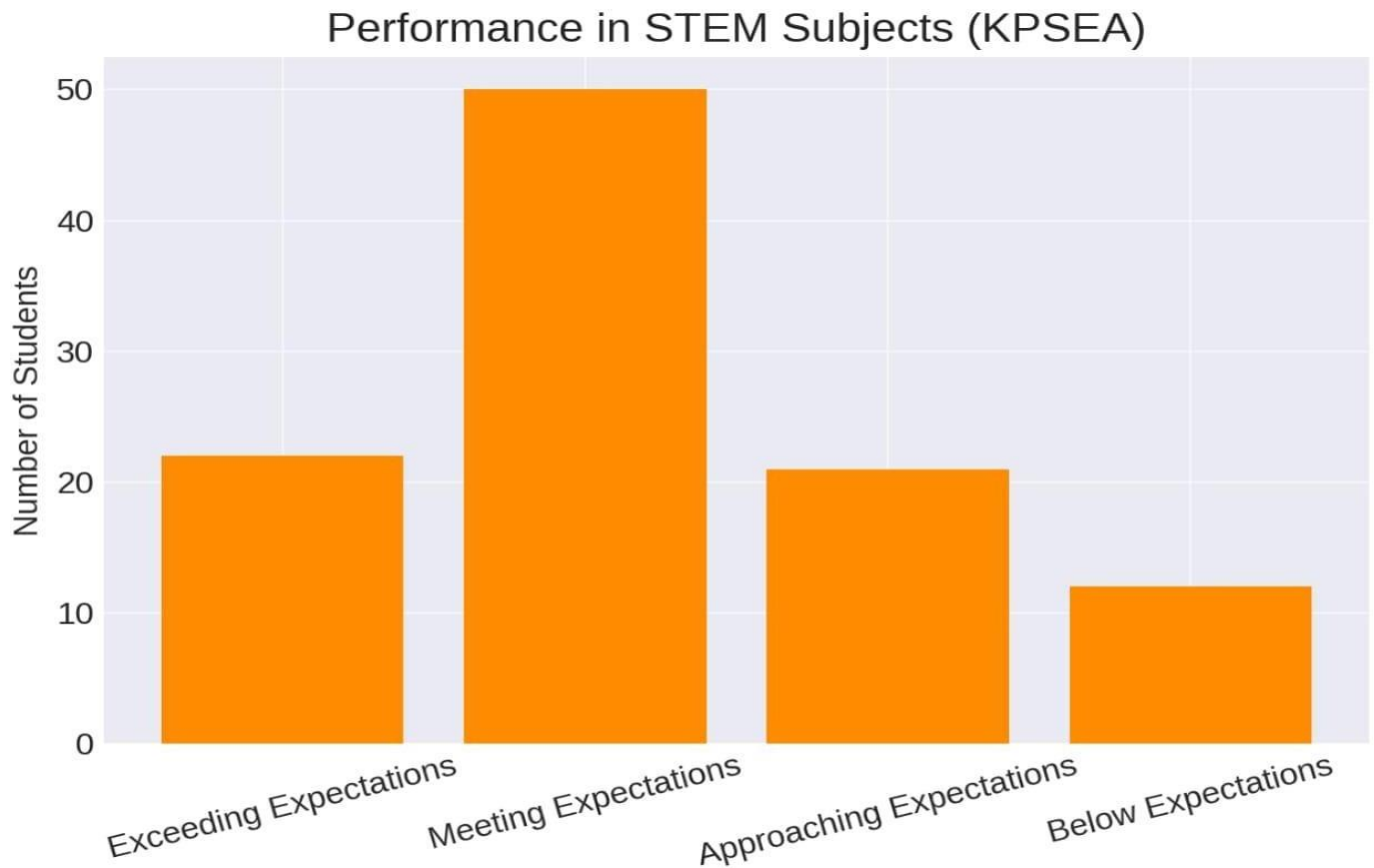
Approximately 70% of students feel more motivated to learn after participating in STEM. This supports the view that STEM increases student interest and involvement in their studies. Students likely perceive STEM as applicable. The 30.5% who are not motivated or neutral may represent those lacking access to resources.

#### 4.6 Performance in STEM Subjects (KPSEA Results Rating)

Table 6: Performance in STEM Subjects (KPSEA Results Rating)

Performance Rating	Frequency	Percentage
Exceeding Expectations	22	21%
Meeting Expectations	50	47.6%
Approaching Expectations	21	20%
Below Expectations	12	11.4%
<b>Total</b>	<b>105</b>	<b>100%</b>

Source: Research Data (2025)



**Source: Research Data (2025)**

Majority of students are meeting or exceeding expectations in STEM subjects. This shows that their performance is generally strong, although there's still room for growth. Students exceeding Expectations likely benefit from favorable classroom environment such as access to learning aids. The 11.4% performing below expectations may reflect challenges such as resource gaps or lack of foundational skills.

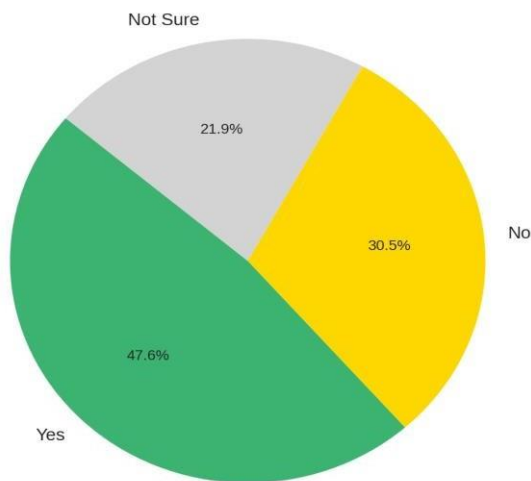
**4.7 Role of Technology in STEM Learning**

**Table 7: Access to Digital Tools**

Response	Frequency	Percentage
Yes	50	47.5%
No	32	30.5%
Not sure	23	22%
<b>Total</b>	<b>105</b>	<b>100%</b>

**Source: Research Data (2025)**

Access to Technology Tools in STEM Learning



**Source: Research Data (2025)**

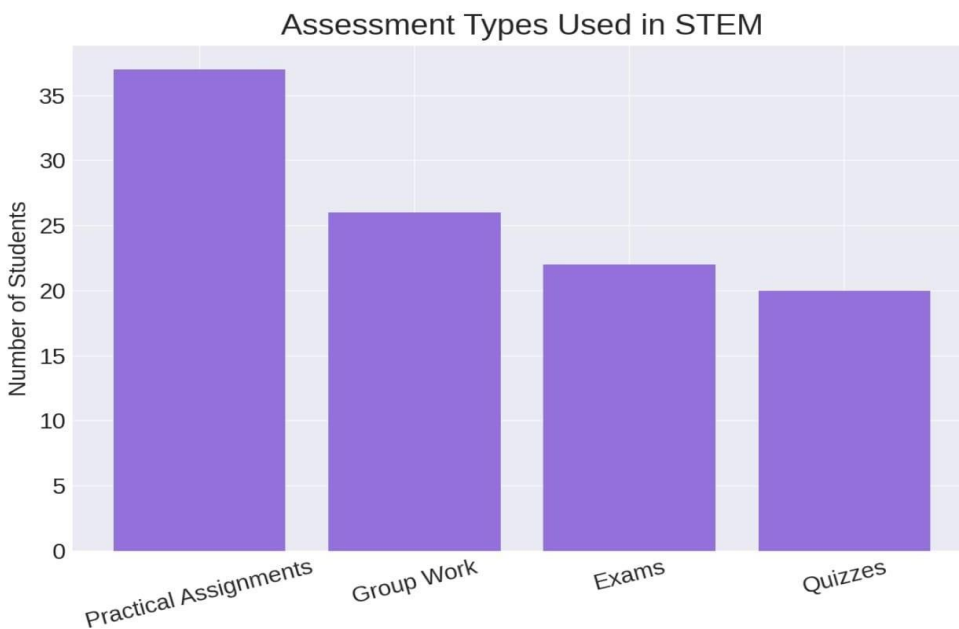
Nearly half of the students have access to technology and 52.5% either lack access or are unsure. Thus, shows that digital inequality could be limiting the benefits of STEM education. The 22% reflects low digital literacy or minimal classroom exposure to technology.

#### 4.8 Modes of Assessment in Integrated STEM

**Table 8:Types of Assessment in Integrated STEM**

Types of Assessment	Frequency	Percentage
Practical assignments	37	35.2%
Group work	26	24.8%
Exams	22	21%
Quizzes	20	19%
<b>Total</b>	<b>105</b>	<b>100%</b>

Source: Research Data (2025)



Source: Research Data (2025)

Over 60% of assessments are practical or collaborative aligning with the constructivist learning theories. These assessments promote critical thinking skills. Students seem to perform better when engaged in group-based tasks. The relatively lower use of exam shows that project based are commonly used.

#### **4.9 Findings**

(i) Motivation as a key driver: High motivation levels confirm that STEM creates engaging environments. This is critical for student persistence in STEM subjects.

(ii) Academic Improvement: Students in STEM show mostly satisfactory performance, suggesting the effectiveness of integration.

(iii) Use of technology: Despite technology's benefits, unequal access remains a major challenge, especially in under resourced classrooms.

(iv) Assessment: Practical, project-based tasks correlate with improved performance supporting the idea that exams are longer sufficient in measuring STEM capability.

## CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

### 5.1 Introduction

This chapter brought together the major findings from the study on how Science, Technology, Engineering, and Mathematics (STEM) influence the academic performance of Jamhuri Junior Secondary School students in Thika Sub-County, Kiambu County. It gave a summary of the findings, drawn conclusions from the results, and offered recommendations that helped improve STEM education.

### 5.2 Summary of the Findings

The study aimed to understand the role of STEM in improving student performance in Jamhuri Junior Secondary School. It focused on three main areas: student motivation and engagement, the use of technology, and modes of assessment. Below is a summary of what the study found:

#### *STEM Increases Student Motivation and Engagement*

Large number of learners reported that being involved in STEM activities were motivated in learning. They said they enjoyed STEM subjects more when learning involved practical projects, teamwork, and real-life applications.

#### *Technology Enhances STEM Learning*

The majority of students said using tools like computers, smart boards, and online videos helped them understand STEM concepts better. However, access was still limited for some students.

#### *Modes of Assessment in Integrated STEM*

Students agreed that STEM assignments and group projects helped them solve problems, and work better with others and are more effective than exams.

#### *Performance in STEM Subjects (KPSEA results rating)*

Most students perform within average or above expected ranges. Some students performed below expectation due to lack of resource gaps or lack of foundational skills

## ***Challenges***

A few students also said they didn't feel encouraged enough to take STEM subjects seriously. Technological tools were inaccessible for some students making it difficult for them to understand STEM concepts better.

## **5.3 Conclusions**

Based on the study, it is clear that STEM plays a big role in improving student performance in Jamhuri Junior Secondary School. When students are exposed to modern technology, engaging teaching methods, and using assessment methods, they perform better. Most learners enjoy learning when the environment supports creativity, teamwork, and critical thinking. In short, STEM is not just about teaching science or math—it's about teaching students how to think, solve problems, and apply knowledge in everyday life.

## **5.4 Recommendations**

Based on the findings, the following recommendations are suggested to improve STEM education and student performance:

### *Expand access to technology*

Schools should be equipped with modern learning tools like computers, projectors, and internet access and more digital tools. Teachers should also be trained on how to use technology effectively in class.

### *Train More STEM Teachers*

The government and education stakeholders should organize more workshops on digital pedagogy and training for teachers so they can teach STEM subjects in an engaging and practical

### *Encourage More Student Participation in STEM*

Schools should create STEM clubs, organize science fairs, inter school contests and involve students in projects that connect what they learn in class to real-life situations and encourage more student involvement.

### *Improve Assessment Methods*

Teachers should use more hands-on projects, group work, and real-life problem-solving tasks instead of relying only on exams. This helps students build thinking skills and learn how to apply them.

### *Provision of Equal Opportunities for All Learners*

Schools in remote areas should be supported with enough resources so that all students, regardless of their background, have the same chance to benefit from. Identify and support learners falling below expectations.

## **5.5 Suggestions for Further Research**

Longitudinal studies to track the long-term impact of STEM integration on academic and career trajectories.

Qualitative research to understand student and teacher attitudes and perceptions toward STEM in diverse school contexts.

Comparative studies between urban and rural schools to identify location-based disparities in STEM education access and outcomes.

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## APPENDICES

### Appendix i: Letter of Introduction

GRETSA UNIVERSITY ,  
SCHOOL OF EDUCATION ,  
P.O. BOX 01000-00200,  
THIKA, KENYA.

16TH OCTOBER 2025.

Dear Respondent,

#### **RE: REQUEST FOR PERMISSION TO COLLECT DATA**

We are students at Gretsa University currently conducting research study entitled "*Role of Science Technology Engineering and Mathematics(STEM) on Student's Academic Performance Of students in Jamuhuri Junior Secondary School in Thika sub-county, Kiambu county.*" The study is being carried out as part of the requirements for the fulfillment of my academic program.

The purpose of this study is to investigate how introduction of STEM in Education curriculum has influenced students of Jamuhuri Junior Secondary School. The research will help in identifying the extend of the problem and provide recommendations that may assist in developing effective strategies on improving STEM study.

We kindly request permission to collect data from students and teachers in your school using questionnaires. The information gathered will be used strictly for academic purposes and will be treated with the highest level of confidentiality. Participation in the study will be entirely voluntary.

Your Approval to conduct this research within the school will be highly appreciated.

Thank you for your time and consideration.

Yours faithfully,

Nelly Cherotich

Agnes Ngeni

Abdalla Keke

Faith Mutuku

Wesly Kipngetich.

## **Appendix ii: Questionnaires for Students**

Gretsa University students are conducting a research study and they require you to fill the questionnaire below. This has been designed to collect data from the selected students information collected in confidential and will not be used against any student. No name or personal information is required.

### **SECTION A: Demographic Information**

1. Gender

Male

Female

2. Grade Level

Grade 9

Grade 8

Grade 7

3. Years in current school

Less than 1 year

1–2 years

3 years or more

## **SECTION B: Motivation and Engagement in STEM Subjects**

4. How motivated do you feel during STEM lessons?

Very motivated

Neutral

Less motivated

Not motivated

5. How often do you participate in STEM projects at school?

Always

Often

Rarely

Never

## **SECTION C: Performance in STEM Subjects**

8. Which best describes your recent performance in STEM subjects(based on KPSEA)

Exceeding Expectations

Meeting Expectations

Approaching Expectations

Meeting Expectations

9. Are you given regular assignments or projects in STEM subjects??

Yes

No

Not sure

**SECTION D: Integration of Technology in STEM Learning**

10. How often do teachers use digital tools (e.g., computers, projectors, videos) in STEM lessons?

Always

Often

Rarely

Never

11. Do you have access to school technology (e.g., laboratories, computers, science kits) for learning STEM subjects?

Yes

No

Not Sure

12. Do you feel that technology helps you understand STEM concepts better?

Yes

No

Not Sure

## **Appendix iii: Questionnaires for Teachers**

### **Section A: Professional Profile**

1. Gender

Male

Female

2. Teaching Experience in STEM subjects:

Less than 1 year

1-5 years

6-10 years

Over 10 years

3. Grade levels taught:

Grade 7

Grade 8

Grade 9

Multiple grades

### **Section B: Student Motivation and Engagement**

4. How would you rate student motivation in STEM classes?

High

Moderate

Low

5. Do you integrate real life examples in your STEM teaching?

Always

Often

Rarely

Never

### **Section C: Use of Technology**

6. How frequently do you use technology in delivering STEM content?

Daily

Occasionally

Rarely

Never

7. What is the availability of digital tools (eg.laptop, projectors) in your school??

Mostly Available

Sometimes available

Rarely available

Not available

## Section D: Performance of Students

8. How do you describe the overall STEM performance of your students??

Excellent

Good

Fair

Poor

9. Which assessment types do you frequently used in STEM??

Exams

Practical assignment

Group work

Quizzes

## Appendix iv: Work Plan

**Table 5.9 Work plan**

Activities	Duration
Problem identification	2 weeks
Requirements gathering	1 month
Data collection	1 month
Data analysis	6 weeks
Documentation	2 weeks
Submission	1 week

**Source: Research data (2025)**