SOCIO-ECONOMIC FACTORS INFLUENCING GENDER DISPARITIES IN ENROLMENT AND COMPLETION RATES OF SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS COURSES IN SELECTED PUBLIC UNIVERSITIES, KENYA

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EGERTON UNIVERSITY

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is entirely my own original work, except where acknowledged, and that it has not been submitted before in any other university for the award of a degree.

Signature: **Date: 08/09/2025**

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GD11/81501/14

Recommendation

This thesis has been submitted for examination with our approval as university supervisor.

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DEDICATION

I dedicate this work to my beloved family: my husband, Reuben, and my children, Grace and Paul. Your constant support made this possible. I pray God's blessings upon you all.

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The Completion of this PhD has been a transformative journey, and I am profoundly grateful to the many individuals who guided, supported, and encouraged me along the way.

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ABSTRACT

In Kenyan public universities, female students consistently have lower enrollment and completion rates in STEM disciplines compared to their male counterparts. This gender imbalance in the STEM labor force is a significant concern. This research sought to explore the gender disparities in enrollment and completion rates in STEM courses and the socio-economic factors that influence these trends. The study's specific objectives were to: determine the gender distribution of students in STEM programs, analyze gendered differences in completion rates, and evaluate the impact of family support, social stereotypes, and career self-efficacy on these metrics. A mixed-methods research design was employed, giving equal weight to both qualitative and quantitative data. The study population consisted of students, faculty deans, department chairs, and student deans from selected public universities. A stratified random sample of 384 students was used, while key informants were chosen through purposive sampling. The results reveal a high number of students enrolling in and completing STEM programs in Kenya. Nevertheless, a clear gender difference in enrollment exists, with male students comprising a larger percentage. Interestingly, no significant difference in completion rates based on gender was identified. The research also found that family support is a critical factor for students' success in STEM. Furthermore, while career self-efficacy positively influences enrollment and completion, social stereotypes present a continuous challenge to both male and female students. The study recommends developing policies to combat negative gender stereotypes in STEM education and increasing efforts to promote female participation. Additionally, parents and guardians should be made aware of the importance of providing academic support to their children.

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LIST OF ABBREVIATIONS AND ACRONYMS

AECA	Agricultural Energy Consumer Association
CDMSE	Career Decision Making Self Efficacy
CUE	Commission of University Education
DEEWR	Department of Education, Employment and Workplace Relations.
EACA	Education Audiovisual and Culture Agency
EEAT	Electrical Engineering Aptitude Test
ERB	Educational Requirement Board
FAWE	Federation of African Women Educationalists
ICT	Information Communication Technology
IEK	Institution of Engineers in Kenya
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
K-R	Kunder-Richardson
KUCCPS	Kenya University and Colleges Central Placement Service
NACOSTI	National Commission for Science Technology and Innovation
SCCT	Social Cognitive Career Theory
SCT	Social Cognitive Theory
SES	Socio-Economic Status
SPSS	Statistical Package For Social Sciences
STEM	Science, Technology, Engineering and Mathematics Vocational Education Training

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

STEM fields are immensely important for a country's technological advancement. They are the bedrock of technological innovation and the source of most patents. These innovations act as engines for economic growth, enhancing the standard of living for developers, consumers, and the entire supply chain (National Academies, 2010; Were 2020). Unfortunately, male and female student admissions to STEM courses are not balanced. Consequently, there is a greater need to boost female student enrollment and support them through to course completion (Dasgupta et al., 2014). The human capital potential represented by girls and women is a resource that is still underutilized and holds the promise of driving significant growth if fully leveraged.

Globally, STEM fields have been and remain vital to economic development. Nations such as China and the United States have leveraged STEM to achieve rapid growth and secure their positions of global influence (Mitchell, 2011). In the 1980s, women's share of engineering degrees in the United States reached over 15%, a significant increase from just 1% in 1970 (Martinez & Christnacht, 2021). While more recent data indicates no improvement in the percentage of female engineers since the 1987 peak of 15%, the trend may be levelling off. The 2009 American Community Survey from the Census Bureau shows that women comprise 48% of the U.S. workforce but only 24% of the STEM workforce. This means their representation in STEM would need to double to match their overall labor force participation. Despite an increase in the number of college-educated women entering the workforce over the last decade, their underrepresentation in certain fields has not seen substantial improvement.

According to the 2022-2023 edition of Engineers Australia, women make up just 13% of Australia's professional engineering workforce. It will take decades until there are as many men in engineering as there are women in the field, if current patterns in university enrolment for engineering courses continue. Information communication technology (ICT)-related student attrition is especially concerning because of the industry's personnel shortages. For instance, in 2009, just 1,997 female students in Australia started a bachelor's degree in ICT, whereas 9,106 male students did the same (DEEWR 2011a). ICT courses experience extremely high dropout rates.

In Sub-Saharan Africa, countries like Zimbabwe and South Africa have made significant strides toward gender parity in science, and in South Africa and Mozambique, women now constitute roughly a third of engineering graduates (Were, 2020). Despite this progress, women remain severely underrepresented in science fields and professions across the continent, as highlighted by numerous studies (FAWE, 1997). At a meeting hosted by the Forum for African Women Educationalists (FAWE), it was observed that in many African nations, girls are still often steered toward "softer" subjects, which limits their access to technical and scientific courses in universities.

The curriculum known as STEM education is based on the premise that students should learn the four core disciplines science, technology, engineering, and mathematics using an applied and interdisciplinary approach. The following outlines the key components of each field. STEM unites four distinct but interconnected disciplines: science, technology, engineering, and mathematics. Engineering uses the principles of science and math to solve problems, while mathematics is the study of numbers and shapes. Technology involves applying knowledge and skills to create products or services with various tools and machines. Science is a body of provable knowledge collected through observation and experimentation. The collective ability to use these four fields to solve complex problems and develop innovative solutions is referred to as STEM skills (Tedor & Ebert, 2017). A distinction is also important between STEM education and STEM careers. In education, STEM refers to learning these subjects either individually or through a combined curriculum. In the professional world, however, STEM refers to occupations that require the application of these skills or a relevant degree within a specific industry.

Developing skills in Science, Technology, Engineering, and Mathematics (STEM) is possible through both formal and informal education systems, such as schools, universities, and the workplace. This allows individuals to acquire more advanced skills. The main places where STEM knowledge and abilities are developed are primary and secondary schools, postsecondary institutions like Technical and Vocational Education and Training (TVET) centers, apprenticeships, and universities. Classifying jobs in STEM is a complex task. While some non-STEM jobs, like an IT support specialist at a law firm, clearly require STEM skills, many roles within STEM sectors such as a human resources specialist at an engineering firm do not. To navigate this complexity, industries often use the International Standard Occupational Classification (ISOC) and International Standard Industrial Classification (ISIC) codes to categorize jobs with STEM-related tasks. Each of these codes covers a broad spectrum of sectors and job types. The United Nations (UN) has underscored the importance of STEM skills for boosting productivity in an era of digitalization and the Fourth Industrial Revolution. In fact, STEM competencies are considered 21st-century skills that can drive economic growth and create new job opportunities. These skills are essential for achieving Sustainable Development Goal No. 8, which focuses on promoting decent work and economic growth for all (United Nations Department of Economic and Social Affairs UNDESA, 2021). However, many developing nations, especially those in Sub-Saharan Africa (SSA), face a significant shortage of STEM talent. According to the United Nations World Population Prospects report from 2019, while young people in SSA make up more than 60% of the global population, less than 25% of them possess STEM skills. This talent gap hinders development and limits job prospects across the region.

In Kenya, affirmative action has been introduced with an aim of bringing balance to the ratio of boys and girls receiving education. Nevertheless, a gender disparity still persists in STEM disciplines. There is lower enrolment of female students in STEM courses and subsequently lower completion rates. Female students remain the minority and more needs to be done to achieve higher retention rates (Mbirianjau, 2018; Omukoba, 2018). It has become apparent that adding STEM courses to the curriculum does not suffice. Strategies and objectives are needed to give promote greater enrolment by female students. Moreover, resources and different mechanisms need to be put in place to retain already enrolled female students (Bokova, 2014).

Despite global efforts to achieve gender equality, women still represent less than 30% of STEM graduates. A study by the UNESCO Institute for Statistics from 2015 to 2018 found that female students made up only 6% to 7% of those enrolled in post-secondary engineering, manufacturing, and construction programs. In sharp contrast, the proportion of male students in these fields was approximately 20% to 21%. This significant gap is particularly pronounced in countries where biases rooted in cultural norms or gender stereotypes influence the behavior of women and girls and their home environments. Unfortunately, women today must contend with more than just their personal interests. Limiting factors, such as social stereotypes about their abilities, income expectations, and the workplace environment, are often ingrained in them from a young age. Many societies continue to categorize professions as "activities for women" or "professions for men," creating an outdated and restrictive division of labor (Camacho et al., 2021). This cultural bias affects career choices and limits opportunities for a significant portion of the population.

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Globally, efforts are underway to address the gender disparity in STEM. Yet, several factors complicate the issue, including an individual's prior educational background, self-efficacy, self-perception, and their cultural and socioeconomic context (Cadaret et al., 2017; Leaper & Starr, 2019; Lent et al., 1994, 2002; Malik & Al-Emran, 2018; Moss-Racusin et al., 2012; Salami, 2007). This declining trend in female participation is noticeable at various stages of their careers—from college enrollment to entry into the workforce and later, as they seek to move into senior professional roles (Amon 2017; Seo et al. 2017).

During a workshop on gender mainstreaming in Kenyan public universities, sponsored by Kenyatta University and the World Bank, it was highlighted that gender disparities in student enrollment, while present at all levels of higher education, become most significant in postgraduate studies, especially in science, mathematics, and other technical fields. The workshop, titled "How to Accelerate Gender Equality to End Poverty on a Liveable Planet," also pointed out that most female academics are employed in fields traditionally associated with women, such as education and social sciences (Arbeit & Yamaner, 2021).

The drive to prioritize STEM (Science, Technology, Engineering, and Mathematics) education in Africa is a complex issue shaped by the continent's unique development needs and opportunities. Researchers such as Badmus and Omosewo (2020) stress that STEM is crucial for developing nations to modernize their industries. The emergence of STEAM (adding Arts) and STREAM (adding Reading) highlights a growing understanding that students need a mix of skills and knowledge to solve real-world problems. A great example of this is the "Internet Backpack" in Liberia, West Africa, a technological innovation studied by Torto et al. (2022). This technology is transforming STEM education and helping to boost the country's agricultural and economic growth. This demonstrates how STEM education can ignite significant change, leading to improvements in food security, healthcare, and the overall quality of life throughout the continent.

In the African context, it is crucial to consider how the formation of STEM identity intersects with racial identity. Morton et al. (2019) explore this dynamic, specifically in relation to Black students at predominantly white universities. Their research on Black X Consciousness in STEM highlights the importance of understanding the role of racial identity in how Black students engage with and learn about science, technology, engineering, and mathematics.

The purpose of STEM education in Africa is to equip the continent's youth with the skills needed to engage with the world's rapidly changing technological landscape, going beyond just academic improvement. This includes bridging the gap in technological knowledge within the classroom, a significant challenge in many African nations (Badmus & Omosewo, 2020). By developing a workforce with a strong STEM background, Africa can enhance its capacity to participate in and benefit from the global economy, especially in sectors where technological expertise is becoming increasingly vital. Furthermore, as highlighted by the research of Torto et al. (2022), it is crucial to connect STEM education with local contexts and challenges like food security and climate change. This approach ensures that STEM education is relevant and impactful for African communities by applying global knowledge to local issues instead of simply importing it without consideration for the regional context.

The case for STEM education in Africa is built on the need for modernization, economic growth, and youth empowerment to tackle 21st-century challenges. Key to this focus are the integration of technology, the recognition of how racial and STEM identities intersect, and the consideration of local contexts.

1.2 Statement of the Problem

Despite ongoing efforts to achieve gender equality in education, significant disparities remain in the enrollment and completion rates of STEM courses at selected public universities in Kenya. The underrepresentation of women in STEM is a complex issue influenced by a range of socioeconomic factors. To close this persistent gap, it is essential to understand the specific factors that contribute to these inequalities in enrollment and completion rates between male and female students. Therefore, this research aims to investigate the socioeconomic factors that lead to gender disparities in STEM course enrollment and completion at public universities in Kenya. By identifying and analyzing these factors, this study will offer insights into the root causes of these inequalities and suggest targeted interventions to promote greater gender equality and equity in STEM fields throughout the country.

1.3 General objective of the Study

The main objective of the study was to investigate gender disparities in enrolment and completion rates of STEM courses in selected public universities, as well as the socioeconomic factors influencing those disparities. In particular, the study sought to evaluate the effect of family support, social stereotypes as well as career self-efficacy.

1.4 Specific Objectives

i. To analyse the gendered differences in enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

ii. To determine enrolment and completion rates of graduates in STEM oriented courses in selected public universities in Kenya.

iii. To assess the influence of family support on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

iv. To evaluate the influence of social stereotypes on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

v. To examine the influence of career self-efficacy on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

1.5 Study Hypotheses

The following were the study hypotheses;

H01: Gender difference has no significant influence on enrolment of students and completion rates in STEM oriented courses in selected public universities in Kenya.

H02: There are no gendered differences in enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

H03: Family support has no significant influence on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

H04: Social stereotype has no significant influence on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

H05: Career self-efficacy has no significant influence on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya.

1.6 Justification for the Study

This study's primary objective was to investigate how gender roles and socioeconomic factors influence the enrollment and completion rates of students in STEM courses at selected Kenyan universities. Despite ongoing initiatives to advance gender equality, significant disparities in STEM education still exist. By examining the impact of gender roles and socioeconomic factors, this research aimed to enhance the current understanding of the root causes of these inequalities. Furthermore, a notable gap in the existing literature concerns the specific gender roles and socioeconomic factors that affect the enrollment and completion of STEM students within the Kenyan context. This study was designed to bridge that gap by providing empirical evidence and a detailed analysis of these unique local dynamics.

The findings of this study offer valuable insights for policymakers, educators, and other stakeholders, helping them create targeted interventions and policies to boost the enrollment and completion rates of students in STEM courses, with a particular focus on female students. Understanding the factors that influence enrollment and completion is crucial for fostering inclusivity and diversity in STEM fields. Ultimately, this research helps create a more welcoming and supportive environment for all students pursuing a STEM education.

Since **STEM** fields are essential for economic development, it is vital to ensure that all students, regardless of their gender or socioeconomic background, have equal chances to pursue and complete a STEM education. By addressing the factors that influence both enrollment and completion rates, this study directly contributes to the economic growth of Kenya.

By investigating the influence of gender and other socioeconomic factors on the enrollment and completion rates of **STEM** students in selected Kenyan universities, this study offers valuable insights. These findings can be used to inform policies and interventions designed to promote gender equality and inclusivity in STEM education.

The study's findings are expected to be highly significant for several reasons. By collecting and analyzing specific data, the research will provide a framework for understanding student dropout rates in STEM courses. This framework can help analysts develop effective solutions for the Ministry of Education and higher education institutions to increase student enrollment in science-based programs. It is also hoped that the study's results will be valuable to other researchers, as they will contribute to the existing body of knowledge on factors influencing student enrollment and completion rates in STEM courses at Kenyan public universities.

Furthermore, the findings can assist the Kenyan government in creating and implementing policies that encourage students to enroll in courses for which they are well-suited and knowledgeable. Finally, the results are intended to help universities better understand students' subject choices, allowing them to provide more effective guidance and support.

This study is particularly relevant now due to Kenya's Vision 2030, which prioritizes STEM education, and the global focus on achieving Sustainable Development Goal (SDG) 5 (gender equality) and SDG 8 (decent work and economic growth). Despite the launch of several initiatives, such as the Young Women in STEM Programme and the Jitume Digital Empowerment Programme, to encourage female participation in technical fields, there is still a lack of empirical data on the specific barriers and enablers that influence this participation.

The findings from this research will provide critical insights for developing targeted interventions. These insights can inform not only institutional policies at the university level but also national policies aimed at improving the retention and graduation rates of women in **STEM**. Furthermore, the study will fill a significant gap in the literature by examining gender disparity in STEM through a socioeconomic lens unique to Kenya, allowing for locally relevant recommendations. This detailed data can also act as a benchmark for regional comparisons, potentially helping neighbouring countries with similar challenges create more equitable and inclusive education systems.

1.7 Scope of the Study

This study was conducted at three specific public universities in Kenya, focusing on students enrolled in **STEM** courses. The faculties included in the research were Health Sciences, Engineering, Pure and Applied Sciences, Computer Science, Agricultural Sciences, Education, Environmental Science, and Building, Construction & Architecture. The study examined several key socioeconomic variables, including gender social stereotypes, family support, and career choice self-efficacy. Enrollment and completion rates, which were the dependent variables, were measured by two metrics: the number of students who enrolled and completed their studies, and the type of employment they secured afterward.

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1.8 Limitations of the Study

This study encountered several challenges. Some respondents were hesitant to share information, worrying it might expose their institutions to competition. They were reassured that the study was for academic purposes and that their privacy would be protected. The study's findings may not be easily generalized to all universities in Kenya. The institutions included in the research are among the country's' largest and most prominent, and as a result, they benefit from the most robust gender mainstreaming efforts. Additionally, the training of science students can vary between universities due to differences in resource availability, which in turn can affect the marketability of their graduates. A further difficulty was scheduling key informant interviews, as deans and registrars were often busy. This required multiple visits and led to interrupted interviews to complete the data collection.

1.9 Assumptions of the Study

Based on the presumptions that the respondents were prepared to provide information freely and fearlessly, and that the sample chosen was accurately reflect the population in all relevant factors, this study was conducted. The timely return of all the questionnaires, the availability and willingness of the people to be interviewed to participate and give truthful, accurate, and comprehensive responses, and the researcher's having enough time to finish the study were all expected. The admissions office and alumni office of the chosen public universities maintain precise and current records on students' enrolment and completion.

1.10 Definition of Terms

Term	Definition as per this Study	Dictionary Definition
Career	According to this study, it refers to the choice in education path a student undertakes in his/her academic life in the institution of higher learning.	An individual's long-term professional path with opportunities for advancement.
Career self-efficacy	It has been used to imply the self-belief and confidence that the STEM have in themselves that they will excel in their programs and future career	Career self-efficacy is the belief that one has the ability to perform tasks and make decisions related to their career
Employability	According to this study, it refers to marketability of the course, opportunities that the course offers to a graduate to generate income or earn a living from the skills acquired.	The quality of being suitable for paid work.
Enrolment	According to this study, it refers to the number of students admitted to a specific course depending on the course requirement.	Enrolment, which is the total number of students registered at a school or college.
Family support	According to this study, it refers to moral, financial and career guidance given to a learner by guardian or family members.	Family support is a range of activities and services that aim to strengthen social networks and promote the well-being of families, children, and young people.
Influence	According to this study, it refers to the extent to which	The capacity to have an effect on the character, development, or

	independent variable affect dependent variable.	Behaviour of someone or something, or the effect itself.
Public universities	According to this study, it refers to institution of higher learning that are sponsored by the government of Kenya.	A public university is a higher education institution that is funded by the government and operates on a non-profit basis
Science, technology, engineering and mathematics courses	According to this study, it refers to courses that are anchored on life sciences and are more practical oriented.	**STEM** is a collective term for the interconnected technical fields of science, technology, engineering, and mathematics.
Selected social-economic factors	According to this study, it refers to income, gender, family level of education that influence the choice of a career among students.	Socio-economic factors (SES) are a range of factors that can impact a person's social and economic conditions
Stereotype	According to this study, it refers to assigning a certain career to a given sex.	A widely held but fixed and oversimplified image or idea of a particular type of person or thing.
Students	According to this study, it refers to any individual who is duly registered to undertake a course in a particular semester.	Someone who is enrolled in a university or another institution of higher learning..

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides a review of current theories, models, and empirical research on how socioeconomic factors influence university enrollment. To provide context, the study first examines the educational landscape in Kenya, detailing the different education systems in place at the time of the research and the transitions between them. It also covers the current state of STEM education in Kenya and the specific points at which students begin specializing in these fields. This background information is essential for understanding the research.

Subsequently, family support as a socio-economic factor affecting enrolment and completion rates will be investigated. The study shall explore literature on family support, its forms and the document impact that it has on education in general. A discussion of the form of family support that is offered by families and the impact that different forms of family support have on education outcomes, specifically STEM education. Additionally, the effects of family support have on STEM enrolment and completion rates in other parts of the world will be explored.

Following the discussions above, the study shall explore literature on gender and enrolment and completion rates. A key focus shall be the propensity of female students selected for STEM courses have to switch courses to arts or social science courses once called to university. This shall be contrasted with the rate of male students selected for STEM courses have of doing the same.

Related to the previous discussion, the study will also explore the social stereotypes in the society regarding gender, education and careers. There is a multitude of stereotypes in society regarding which genders are suited for which careers. There are especially many negative stereotypes regarding women in STEM. These stereotypes have an effect on career decisions, which affects which courses they enrol in and how easily they are able to complete their academic programmes successfully and in a timely manner.

The study also delves into existing literature on career decision-making self-efficacy (CDMSE). It explores CDMSE's connection to both enrollment and completion rates, with a specific focus on how it relates to STEM fields. The research further investigates the relationship between CDMSE, gender, and family support across a variety of different contexts.

Finally, this study will explore the theoretical framework that underpins the research: Social Cognitive Career Theory (SCCT). We will examine the theory's definition, history, and significance, as well as its specific relevance to the objectives of this study. The conceptual framework will then be presented, outlining all the variables involved in the research.

2.2 Global Perspectives on Gender and STEM

The gender gap in STEM is a well-documented global issue, though its underlying causes vary by region. For example, in the United States, women make up only 28% of the science and engineering workforce despite earning nearly half of all bachelor's degrees (NSF, 2020). In other countries, such as Germany and Japan, women's representation in STEM fields is even lower, falling below 20%. This suggests the presence of deeply entrenched barriers within their educational and work cultures. In contrast, some nations like Malaysia and Tunisia have nearly achieved gender parity in university STEM programs. This success is largely due to national policies that actively promote and support women's education in science and engineering (Chavatzia, 2017). Their experience highlights the positive impact of deliberate policy interventions.

These examples demonstrate that gender disparities are not inevitable and that deliberate policy, cultural shifts, and educational reforms can close the gap. In Rwanda, for instance, targeted scholarship programs and female-led STEM campaigns have dramatically increased the number of women studying computer science and engineering. Similarly, India's "Beti Bachao, Beti Padhao" initiative has helped shift public perception of girls’ education, including in technical fields. These global case studies offer lessons for Kenya, emphasizing the importance of addressing not only economic barriers but also deep-rooted social norms and institutional biases. A comparative lens also highlights the importance of aligning national STEM strategies with cultural contexts to achieve sustainable gender parity.

2.3 Education Situation in Kenya

Kenya is a republic in East Africa that shares borders with Tanzania, Somalia, Ethiopia, South Sudan and Uganda. The country gained independence from Britain in 1963. According to the Kenya National Bureau of Statistics, its population was 41.8 million in 2015. After becoming an independent nation in 1964, Kenya faced a severe shortage of skilled professionals to fill positions previously held by colonial officials and to meet its citizens' educational needs (Nwauwa, 2020)

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In order to better address the needs of its communities, Kenya established several commissions. One of these recommended a shift from the 7-4-2-3 education system to the 8-4-4 model. The previous framework, 7-4-2-3, consisted of seven years of primary school, four years of lower secondary, two years of upper secondary, and three years of university (Buchmann, 1999). Kenya's current educational framework, the 8-4-4 model, involves eight years of primary school, four years of secondary education, and four years of university. However, a new Competency-Based Curriculum (CBC) is now being implemented to replace this system (Amutabi, 2021).

It is particularly challenging for students from minority groups and women to enroll in STEM programs. While women earned 58% of all bachelor's degrees in 2016, they received fewer STEM degrees than men across all racial and ethnic groups. Women, who make up 49% of all college students nationwide, account for only 42% of STEM degree recipients (Li et al., 2019). This underrepresentation of women in STEM begins in childhood and is influenced by a range of factors, including peer pressure, cultural norms, mentors, family, and society (Kahn & Ginther, 2017). A number of factors are cited for the lower number of women in technical fields, including a lack of female role models, persistent gender stereotypes, and less family-friendly flexibility in post-graduation STEM careers (Beede et al., 2011). When broken down by ethnicity, white individuals receive the largest share of STEM degrees at 52%. This is followed by Asian/Pacific Islanders at 6%, Hispanics at 14%, and African Americans at 12% (Li et al., 2019). Students from low-income families, women, and minorities also have the highest dropout rates from STEM programs (Smith et al., 2018). According to Mau (2016), students who major in STEM tend to be younger and have higher GPAs, standardized test scores, and more credit hours than students in other majors. Additionally, 38.4% of STEM students are first-time freshmen, compared to 29.4% of non-first-time freshmen, which indicates a strong early commitment to these fields.

Education serves as a crucial tool for a nation's social, economic, and political advancement (Riechi, 2021). Many countries, especially in Africa like Kenya, believe that progress in education leads to rapid economic growth, fairer distribution of wealth and income, and an increase in skilled human resources and political stability (Riechi, 2021). The Kenyan government demonstrates its commitment to education by allocating approximately one-fifth of the national budget to the sector (Kenya National Bureau of Statistics, 2014). While primary education is provided free of charge, students are required to cover costs for all other educational levels. Despite this, many parents choose to enroll their children in private schools, opting to pay for their education from the very beginning (Abuya et al., 2015).

As children transition between educational levels, they acquire knowledge and encounter diverse learning environments. Educational environments serve as socialisation agents, providing students with diverse learning opportunities and facilitating the acquisition of information regarding various career options, thereby potentially shaping their occupational aspirations. Doyle (2023) contends that education serves to provide career guidance for pupils and a venue for the investigation and advancement of diverse occupations. The acquisition of career knowledge is referred to as career education. This includes structured, school-based programs, usually at the middle and high school levels, aimed at familiarising pupils with the workforce, evaluating career-related personal characteristics, and investigating career alternatives that correspond with these characteristics.

In Kenya, career guidance for students is integrated into school-based guidance and counseling services, which are designed to help students navigate challenges in the educational environment. However, these services tend to prioritize academic and disciplinary issues over mental health and emotional well-being. According to Ibrahim et al. (2014), these counseling services are intended to help students make informed career decisions. Furthermore, high schools in Kenya often exclude parents from discussions about their children's career education, limiting their involvement to disciplinary and academic matters (Ibrahim et al., 2014). Career education is typically provided at the high school level, specifically during the fourth year, when students are expected to make crucial career decisions. Despite this guidance, students frequently face significant challenges in choosing a career, as these choices are dependent on their national examination results.

Kenya's 8-4-4 education system used two national examinations to evaluate students. The first, the Kenya Certificate of Primary Education (KCPE), was taken by students at the end of their eighth year of primary school. The results of this exam determined a student's placement in high school, with institutions classified as national, county, or sub-county. National schools admitted only the country's top-scoring students, while county schools accepted those who scored at or near the county average. Sub-county schools enrolled all other students who did not meet the admission criteria for the higher-ranked schools (Wekesa & Kitainge, 2022).

The second national exam, the Kenya Certificate of Secondary Education (KCSE), was administered at the conclusion of high school and directly affected a student's eligibility for university admission (Miligan, 2017).

The Kenya Certificate of Secondary Education (KCSE) is considered the more critical of the two national exams because it directly influences students' career choices. The results of the KCSE largely determine which career paths and university courses students can pursue. The highly competitive nature of this exam places immense pressure on students from their schools, teachers, and families to achieve excellent scores. At the secondary school level, students often have limited time for career exploration and decision-making (Lee & Kim, 2015), as most of their time is dedicated to preparing for the KCSE. As a result, Kenyan secondary students typically begin their career exploration and form specific career goals only after receiving their exam results or when they secure university admission. Consequently, career decision-making is often dictated by academic performance (Kulcsár et al., 2020) rather than by career guidance, personal interests, or individual abilities. While students can select a career path before the national exam, their choice may be invalidated if their exam scores are insufficient (Christopher, 2022).

For most Kenyan college students, career decisions are made after high school or during their university years, making the college period a critical time for career development. While high school provides insufficient opportunities for career exploration, there is also a lack of formal career education at the university level. Instead, the available information is limited to course descriptions and lists of potential careers for graduates (Kenya Universities and Colleges Central Placement Service, 2015). Despite this, it's essential for students to use career services to improve their Career Development and Management Self-Efficacy (CDMSE). Educational institutions serve as platforms for students to enhance their employability, but many students still lack the skills needed to make well-informed career choices (Lock, 2020).

The quantity of colleges in Kenya is escalating, alongside a surge in student enrolment in collegiate programs. A growing cohort of students is enrolling in academic programs with the anticipation of obtaining lucrative work post-graduation. Although the enrolment of students in higher education is rising, these individuals constantly face alarming unemployment rates post-graduation (Koech, 2021). Kenyan college graduates encounter unemployment following the investment of numerous years and resources in acquiring their degrees. This imposes an economic strain on the family and induces stress for new college graduates. A career is critical due to the accompanying economic, social, and political benefits. All nations strive to augment their human capital, as the advancement of human resources is crucial for economic success.

The history of STEM education in Africa is a complex issue, deeply linked to the continent's broader educational and socio-political past. This evolution, often shaped by external influences such as colonialism and globalization, marks a transition from traditional African knowledge systems to more modern educational structures.

Badmus and Omosewo (2020) shed light on the evolving educational landscape in Africa, particularly in STEM. They note that the need to equip students with the skills required to solve real-world problems has driven the adoption of STEM, STEAM (adding Arts), and STREAM (adding Reading) curricula. This shift signifies a departure from traditional teaching methods and a move toward more integrated and holistic educational models designed to prepare learners for the complexities of modern life.

Mkhize (2023) provides a critical viewpoint on the development of STEM education in South Africa, with a focus on African women's experiences in these fields. Due to colonial ideas, white men have historically dominated STEM disciplines, which has influenced African nations' educational systems. According to Mkhize, the process of change in STEM fields at South African institutions has been sluggish and frequently amounts to just minor adjustments rather than a complete overhaul. The difficulties in transforming STEM education to be more inclusive and reflective of the various identities found in African countries are thus brought to light (Mkhize, 2023).

Examining the historical roots of African formal education curricula, Ezeanya-Esiobu and Ezeanya-Esiobu (2019) highlight how colonial forces had a big impact on education, especially STEM education. The primary goal of missionaries' and colonial governments' adoption of Western education was to develop a workforce to help with administrative tasks rather than to improve African civilizations. The design and subject matter of African educational systems, especially STEM education, have been influenced for a long time by this colonial past. Since African nations remained to depend on previous colonial powers for educational guidance, the post-colonial era did not instantly bring about significant reforms to these institutions (Ezeanya-Esiobu & Ezeanya-Esiobu, 2019).

Historically, STEM education in Africa has evolved from traditional, indigenous knowledge systems to frameworks that are more aligned with international standards. This transformation was often a result of external influences like colonialism. The shift has involved incorporating modern skills and knowledge into the curriculum while also working to create more inclusive and representative learning environments. According to Mkhize (2023), simply reforming STEM education isn't sufficient; the experiences of African women in these fields demonstrate that a more fundamental change is necessary. Similarly, Ezeanya-Esiobu (2019) argues that the legacy of colonialism continues to influence the content and structure of African STEM education, which presents both challenges and opportunities for future progress.

Given its potential to drive economic growth and solve socioeconomic problems, the current state of **STEM** education in Africa requires close attention. Mutsvangwa and Zezekwa (2021) offer a detailed analysis of how STEM education can promote sustainable living in Africa, particularly in Sub-Saharan countries. They point out several significant obstacles to its expansion, including limited resources, overcrowded classrooms, outdated curricula, a scarcity of skilled teachers, and inadequate training for teachers in both their subjects and instructional methods. They also highlight a notable gender gap, stating that less than 25% of African university students are pursuing STEM degrees, and of that group, only 30% are female (Mutsvangwa & Zezekwa, 2021).

In their global analysis of STEM education, Bryan and Guzey (2020) emphasize the field’s importance for increasing competitiveness, productivity, and prosperity. They highlight how integrated STEM education is critical for solving both current and future problems. This global perspective is particularly relevant to Africa, where incorporating STEM fields could significantly impact socioeconomic development and educational policy. While not directly about Africa, a systematic review by Aslam et al. (2022) on the state of STEM education research in Pakistan provides valuable insights for African nations. Their review found a lack of research in STEM education, especially at the K-12 and post-secondary levels. This situation mirrors the challenges faced by many African countries, where STEM education is still developing and requires substantial research and growth.

The current state of STEM education in Africa is marked by several challenges, including insufficient funding, poor teacher training, and persistent gender inequality. Despite this, the importance of STEM in driving economic growth and addressing socioeconomic problems is increasingly recognized. By integrating STEM disciplines, as is discussed globally, African nations can strengthen their educational systems and better prepare their students for the challenges of the 21st century. The future of STEM education in Africa depends on overcoming these identified issues and applying best practices and insights from around the world.

The growth and effectiveness of STEM education in Africa are hindered by a number of challenges. According to Mutsvangwa and Zezekwa (2021), these include a lack of resources, overcrowded classrooms, outdated curricula, a shortage of skilled STEM teachers, and insufficient training in both subject matter and teaching methods. These issues are further complicated by significant gender gaps, as less than 25% of African students pursuing STEM degrees are female.

The transformation of STEM courses in African Education Systems (AES) is attributed to information and communication technologies (ICTs), according to Barakabitze et al. (2019). They highlight the difficulties in incorporating ICTs into the classroom, such as inadequate infrastructure, restricted technology access, and inadequate teacher preparation.

Notwithstanding these obstacles, ICTs offer chances to raise the standard of STEM education through programs like intense teacher training in ICT and the establishment of innovation spaces and living laboratories (Barakabitze et al., 2019). The limits of resources, knowledge, and experience to deal with new trends for meaningful classroom integration in Africa are covered by Badmus and Omosewo (2020). They stress that in order to overcome the obstacles to technology integration in African classrooms, solutions from fields like robotics are required. One major obstacle to the development of STEM, STEAM, and STREAM approaches in Africa is the lack of information and experience (Badmus & Omosewo, 2020).

Africa faces many challenges in STEM education, including limited resources, poor infrastructure, gender inequality, and insufficient teacher training. Solving these issues will require a collaborative effort from various groups, including governments, academic institutions, and international partners. The integration of Information and Communication Technology (ICT) and advanced methods like robotics can be crucial in overcoming these obstacles, ultimately improving the quality and accessibility of STEM education throughout the continent.

To improve learning outcomes and experiences in African education, it is essential to integrate technology and innovation into STEM education. Gillet et al. (2019) discuss the Go-Lab Goes Africa (GO-GA) initiative, a project supported by the European Commission aimed at promoting and implementing digital STEM education in secondary schools throughout Africa. This initiative highlights the importance of incorporating technology into modern teaching methods and offers a structured approach to overcoming challenges and achieving success in digital STEM education. Similarly, a 2020 study by Liu et al. explores how internet technologies can improve technical education and keep pace with rapid technological advancements. Their research, which involved students from Russian and Chinese universities, demonstrates that integrated online STEM education significantly boosts student engagement and academic success. According to Liu et al. (2020), this finding is relevant to the African context, as internet technologies can be used to enhance STEM education and solve issues like limited access to expert knowledge and high-quality resources.

In their case study, Nicolete et al. (2015) examine a project that incorporated technological resources into basic mathematics classes in Brazil. This praised initiative proposes using mobile learning to teach traditional STEM subjects. Nicolete et al. (2015) argue that the project's success in Brazil offers valuable lessons for similar efforts in Africa, where digital and mobile technologies could be used to enhance and motivate STEM education.

STEM education must include innovations and technology if African educational practices are to progress. Initiatives like GO-GA demonstrate how digital technology may transform educational experiences, while research on online technologies in STEM education highlights the importance of integrating these tools to enhance student engagement and learning outcomes. Further proof of how incorporating technology can improve STEM teaching and motivate students can be found in the Brazilian case study. These findings are crucial as African educational systems strive to solve 21st-century challenges and prepare students for a technologically advanced global economy.

Given the unique opportunities and challenges in Africa's educational landscape, the roles of non-governmental organizations (NGOs) and the government in promoting **STEM** education are crucial. Adu-Baffoe and Bonney (2021) explore the critical role of NGOs in Ghana's basic education, highlighting contributions from groups like **Action Aid Ghana** in building infrastructure, providing learning materials, and training teachers. However, the persistent challenges in improving student performance show that more comprehensive and collaborative approaches are needed.

From tiny local groups to major international organizations, Brophy (2020) explores the diverse roles that NGOs play in promoting education in Africa. These organizations have changed from depending on small charity to getting significant government financing, and they frequently mirror the goals of their founders. As part of larger socio-political tactics, Brophy highlights the changes in NGO funding and the consequences of government participation in NGO education programs (Brophy, 2020).

The function of NGOs in South Africa is examined by Makofane and Selepe (2022), with a focus on rural development, which includes educational programs. They draw attention to the variety of NGOs' organizational forms, structures, and cultures as well as their crucial function in delivering necessities like healthcare, education, and employment opportunities. In light of decentralization and decreased social spending, the study emphasizes the value of NGOs in bridging the gaps created by government policies (Makofane & Selepe, 2022).

Addressing the complex issues surrounding STEM education in Africa requires the participation of both the government and non-governmental organizations. NGOs frequently contribute the creativity, adaptability, and grass-roots connections necessary for successful educational interventions, even though governments supply the financing and policy guidance. More powerful and long-lasting educational results can result from these organizations working together. But it's imperative to make sure that these partnerships support the broader objective of enhancing STEM education throughout the continent and are in line with the educational requirements of African communities.

Comparing STEM education in Africa with global trends offers significant insights into educational methods, challenges, and developments in different regions. A study by Li et al. (2020) used CiteSpace to compare STEM education research from 2016 to 2020, highlighting its global impact on educational practices and policies. Their findings show that while developed nations like the U.S. and Australia have long integrated STEM into their national plans, countries like China have more recently increased their focus on the subject, indicating its growing worldwide importance. In a comprehensive review of STEM education literature over the past 15 years, Zhan et al. (2022) focus on global distribution and research trends. Their research reveals that STEM education is gaining popularity among academics and is evolving with a focus on regional, interdisciplinary, and cross-domain collaboration. The study notes a difference in priorities between developed and developing nations: while Western countries have focused on educational equity and disciplinary integration, developing nations, including those in Africa, tend to concentrate more on teaching methods. This highlights the distinct priorities of different regions regarding STEM education.

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The Global North and South's representation and thematic focus in engineering education literature are examined by Wolff et al. (2022), who also offer insights into these regions' thematic distinctions. According to their research, the Global South—which includes African nations—is under-represented in both the quantity and effect of education research. The study also identifies thematic distinctions, such as the Global South's emphasis on comprehending problems at the statistical and curriculum levels vs the Global North's emphasis on demonstrating creative teaching methods in environments with greater resources (Wolff et al., 2022).

A number of important facts are brought to light by the comparison of STEM education in Africa with worldwide trends. First of all, the value of STEM education is widely acknowledged, and both developed and developing nations are progressively implementing STEM education initiatives. The second difference is that whereas poor nations, notably those in Africa, place more emphasis on pedagogical techniques, industrialized nations place more emphasis on educational equity and disciplinary integration. In order to address the particular difficulties and take advantage of the opportunities in African STEM education, more focused research and policy interventions are required, as evidenced by the Global South's under-representation in STEM education studies and thematic disparities in focus.

There are several gaps in the literature that must be addressed to improve the effectiveness and reach of STEM education in Africa. Mutsvangwa and Zezekwa (2021) identify major obstacles hindering the expansion of STEM education in Africa, including a lack of resources, overcrowded classrooms, outdated curricula, a shortage of trained teachers, and inadequate teacher preparation. These challenges highlight the need for further research aimed at creating practical solutions and strategies to overcome them. While not focused on Africa, a comprehensive literature review by Aslam et al. (2022) on STEM education in Pakistan sheds light on the issues faced by developing nations. Their research shows that STEM education, particularly at the K–12 and university levels, is under-researched. This situation is similar to many African countries, where more in-depth studies are needed to understand and address the unique obstacles in STEM education. Similarly, a systematic evaluation of STEM education studies in the Gulf Cooperation Council (GCC) nations by Kayan-Fadlelmula et al. (2022) identifies patterns, gaps, and challenges. Their findings indicate that student achievement in STEM has not improved significantly despite educational reforms and increased funding. This work underscores the importance of identifying and addressing the gaps in STEM education research and the factors that influence student engagement, both of which are highly relevant to the African context.

The gaps in **STEM** education research in Africa and similar regions highlight several areas that need further study and development. These include creating curricula that are relevant to local contexts, finding ways to improve resource allocation, developing methods to boost student engagement and performance in STEM disciplines, and researching effective teacher training programs. To make STEM education more interesting and applicable for African students, it is also necessary to investigate creative ways to incorporate technology and real-world applications. Filling these gaps will be critical to empowering African nations with high-quality STEM education and preparing their youth for the challenges of the 21st century.

Over the past decade, Kenya has made policy strides aimed at strengthening STEM education. The Ministry of Education has developed several strategic frameworks, such as the National Education Sector Strategic Plan (NESSP 2018–2022), which emphasizes the development of STEM capacity at all levels of education. Specific initiatives include the establishment of Centres of Excellence in STEM and targeted scholarships for female students pursuing science and engineering courses.

Despite these efforts, implementation remains inconsistent. A 2021 report from the Kenya Institute of Curriculum Development (KICD) found that most public universities do not have gender-sensitive policies specifically for STEM, which leads to systemic gaps in the recruitment, support, and retention of female students. Furthermore, these policies often fail to address socio-cultural barriers such as early marriage, domestic obligations, and community perceptions that continue to affect girls' transition from secondary school to university-level STEM fields.

There's also a need for stronger collaborations between universities, industry, and the government to ensure STEM curricula align with the evolving demands of the job market, particularly in the digital and green economies. Without clear monitoring and accountability frameworks, national STEM goals risk remaining mere aspirations. This study's focus on enrollment and completion within the context of socioeconomic factors helps evaluate whether these policy aspirations are translating into real educational outcomes.

2.4 Family Support on Enrolment and Completion of Science, Technology, Engineering and Mathematics Students in Public Universities in Kenya

Family support, a key independent variable in this study, is defined as any type of help or communication a student receives from family members including parents, guardians, or siblings to assist with career choices. This support can take many forms, such as financial aid, involvement in educational activities, help with schoolwork, and providing encouragement. All these actions are intended to aid students in their professional decision-making and career development. According to Akinlolu et al. (2023), family support can be categorized into four main types: emotional support, which is based on trust and affection; instrumental support, which includes providing resources like money; informational support, which involves giving knowledge and advice; and appraisal support, which is about offering feedback and evaluation. The Social Cognitive Career Theory (SCCT) identifies family support as a critical environmental factor that enhances an individual's ability to make informed career decisions.

The socialisation of the female kid has influenced her scholastic prospects, achievements, and overall success. Girls are rendered inferior, their standing is diminished, and they are perceived as less significant than boys. Items perceived as designed for boys ultimately fail to engage the interest and excitement of girls. If girls are ostracised from society for violating the rules, they will not strive to surpass the boys in any aspect, including education (Gitonga, 2019). Girls aim to enrol in educational institutions to enhance their skills and competencies, while simultaneously pursuing equal rights and opportunities. Currently, most women aspire to attain opportunities for empowerment. Child marriage, female feticide, and female infanticide have been practiced and are detrimental to the growth and development of girls. In rural communities, there exists a perception that girls are liabilities and should just be instructed in domestic responsibilities. Their training primarily emphasises domestic responsibilities such as meal preparation, cleaning, water collection, livestock management, sewing, embroidery, child development, and catering to the needs of the elderly and other household members. These reasons hinder them from pursuing education (Gitonga, 2019).

When girls are confined indoors and not encouraged to interact with the outside world, their mindset is negatively impacted. They may face mistreatment and abuse, in addition to being laughed at, mocked, and scorned. Such experiences make them feel vulnerable and uncomfortable, making it difficult for them to stand up for themselves and improve their knowledge, skills, and abilities. Prior educational research shows that girls have long been denied access to adequate education as a result of gender socialization. Boys are given the majority of educational opportunities and are considered to have more importance and self-worth. Family finances are primarily used for boys' education. When families are experiencing financial hardship due to widespread poverty, younger girls are often sent home to work to help their parents save money for their brothers' education. This puts the female child's education at risk (Gitonga, 2019).

Boys are often given more opportunities in school and are seen as more important, with higher self-esteem. Family money is typically spent on the education of sons. In cases of widespread poverty and limited resources, younger girls are often pulled out of school to help their parents earn money for their brothers' schooling. This puts the education of girls at risk (Sirin, 2005).

A recent study in France examined a program designed to boost parental involvement in their children's schooling, yielding highly promising results (Strocchio et al., 2019). The curriculum underscored the importance of parental engagement and provided parents with more information about the school system, including the roles and responsibilities of staff and administration. Although the outcomes were very positive, this approach has yet to be applied in environments where parents generally have lower levels of education.

A study indicated that average examination and test results generally decline when individuals from the lowest socioeconomic strata gain increased access to schooling (Jensen, 2021). Furthermore, a positive correlation exists between students' test and exam scores and their parents' educational attainment and income (Park & Holloway, 2013). Research comparing Zambia and Uganda demonstrates a significant association between parental income and educational attainment and students' test and examination scores. In Zambia, students from the most developed regions outperformed their counterparts from the least developed regions by 20% on English exams in 2005. The socioeconomic status of families and their geographic location have been shown to influence equity. Academic achievement is affected by the socioeconomic status of the parents (Zuze & Beku, 2019). Children from affluent families possess certain physical and social requirements that, when met, enhance their academic performance. These criteria may encompass enrolment in premier local schools, provision of a conducive reading environment, adequate nutrition, availability of a playground, and access to books and other materials. All of these contribute to promoting effective learning and elevated academic performance (Sirin & Gupta, 2015). Children of parents with elevated educational attainment are statistically more inclined to enrol in secondary school (Mwihia, 2020). The quantity of television children are allowed to view, the frequency of school transitions, and parental involvement in their education are all critical factors.

A similar study further substantiated this by demonstrating that parental influence in modern culture is essential for a student's academic achievement, necessitating teamwork among parents, instructors, and students (Mumasi, 2013). The emotional and material contributions influencing children's educational motivation are contingent upon parental involvement. A study was conducted in rural Pakistan regarding the accessibility of primary schools for girls and the presence of female educators. They asserted that while parents concurred on the necessity of basic education for both boys and girls, they underscored that boys' education should be prioritised due to their role in fulfilling the family's financial responsibilities (Mumasi, 2013). The socioeconomic status of successful sons enhances the quality of life for parents in their latter years, as reported by both mothers and fathers. Most parents desire their children to have both a secure financial future and a reputable social status (Suleman et al., 2015). Notwithstanding this, the level of education remains significantly low, especially among women. The majority of parents dissuade their daughters from pursuing formal education. Moreover, several additional factors affect their daughter's education, including the father's profession, family size, social class, income, and educational qualifications.

Parents have different views on their daughters' education, with those who have higher levels of education showing more interest in their daughters' schooling. Compared to their rural counterparts, urban parents are more concerned with their daughters' education (Rafiq et al., 2013). In addition to involvement in household tasks like collecting water and firewood, caring for children, and going to the market, the social standing of a family has a significant impact on females' academic success in the Tolon District.

In Tolon District secondary schools, girls' academic performance is more influenced by their family's financial situation. Girls from wealthier families receive better care, allowing them to focus more on their studies. In contrast, girls from low-income homes are negatively impacted by a lack of basic necessities, which hinders their school involvement. A family's size and the birth order of a girl also have a greater impact on her academic achievement; those from moderate-sized families with four children and a birth order of one to four typically have higher academic success. The number of siblings who are employed or enrolled in marketable, college-level courses also affects a female student's academic performance (Mumasi, 2013).

According to a report on socioeconomic position and accomplishment, factors outside the classroom, like family background, neighbourhood, and advancement, have an impact on higher learning levels in the US. Scores and transition rates are used as primary indicators of success. Exams are widely regarded as reliable indicators of performance in Ghana (Romata et al., 2015). Students' performance on the West African Examination Council (W.A.E.C.) tests determines their placement in secondary school and, to a lesser extent, their admission (George et al., 2012).

The best indicator of a child's educational success is family participation. This component has a strong correlation with children's low conduct issues, receptive vocabulary skills, attention span, task persistence, and drive to learn. It has been determined that family involvement in education improves early children's learning (Kurtulmus, 2016). The primary responsibility for socialising children to become contributing members of society rests with the family. Children are more inclined to achieve academic success and develop into responsible, productive societal members when their parents are actively engaged in their education.

Parental involvement is not only essential but also one of the most cost-effective ways to improve educational outcomes (Hogenhout, 2018). Higher levels of parental engagement at home such as supervision, monitoring, and daily conversations about school have been linked to better reading and writing scores and higher report card grades for children (Park & Bills, 2015). For girls specifically, their parents' attitudes and support significantly influence their engagement and academic performance. The views of both parents and the community are primarily shaped by traditional ideas about the appropriate roles of women and girls in society. In the past, women could only play the roles of mothers and wives. As a result, women were viewed as nurturers who primarily supported males who worked to maintain the family. Women were therefore seen as less capable and in need of men's protection and direction because they were physically weaker. Even in modern times, when socioeconomic shifts have led to modifications in the roles that women are now expected to play, these sentiments have persisted (Park & Bills, 2015).

Education has become essential due to socioeconomic shifts, not only because it offers opportunities for earning money but also because it may help raise the living standards of people, families, and communities. The parents' attitude demonstrates how supportive the family is of their kids' education. Parental attitudes can be either positive or bad. Children may not receive an education if their parents have a poor attitude towards education and schools. Insufficient parental support for academic tasks may result in diminished motivation and self-esteem in children. In many cases, a positive attitude from parents can benefit their kids, as evidenced by improved class performance, a greater interest in learning, and higher reading and writing achievement scores (Keys, 2015). It's possible that parents don't fully understand the advantages of educating their daughters. The number of parents who do not understand the value of education is intergenerational and actually grows over time. Alternatively, families might not recognise the value of education. A nation that questions whether more educated women are "suitable" to make excellent brides. According to the same study, women with higher levels of education have fewer options when it comes to marriage. When curricula conflict with the values parents wish to instil in their children or are unrelated to the mother-wife role, parents find it difficult to comprehend the advantages of education.

These cultural factors vary greatly between and within nations, and they also influence the educational attainment of parents, which in turn influences the school enrolment of girls. Families may also differ in their views on the acceptability of child labour and the importance they place on educating children due to cultural and parental education (Liyanage, 2014). Gender disparities in schooling are significantly influenced by parents' educational backgrounds. Research shows that parents appreciate formal education for their daughters more the more educated they are. The level of parental education gauges how receptive parents are to influences outside of tradition.

When more direct measures are unavailable, parental education can serve as a limited indicator of a family's socioeconomic status (King et al., 2014). Many researchers agree that a parent's literacy, especially the mother's, influences a female student's academic performance and engagement (Moffit, 2017). African women bear a significant responsibility for their children's education. Their ability to keep their children in school largely depends on their own educational background and resource management. Studies suggest that households with educated women are more likely to enroll both boys and girls in school and keep them there longer than households with either educated men or uneducated women. This implies that a mother's level of education has a significant impact on her daughters' school involvement. Their daughters may also view their mothers as role models (King et al., 2014).

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Numerous cultural practices in Somalia, particularly in Puntland, jeopardise girls' access to education and, consequently, their involvement in the full educational cycle. Many customs highlight how females are still viewed as their families' property in many societies, as well as in many parts of Africa, with little to no influence over their future. Girls' domestic roles are defined by culture. Girls are tasked with doing time-consuming household tasks like cooking and cleaning. As a result, girls have less time for homework or studying. In general, household tasks have an impact on schoolwork, especially for girls who are overburdened with both school and homework (Holgado et al,. 2014).

In some parts of Puntland, women and girls venture into nearby cities and villages to engage in trading, which is frequently a profitable endeavour. Due to their success, additional schoolgirls have been enticed to pursue this enterprise, which has resulted in school dropouts. Numerous research have examined the sociocultural factors that hinder girls' access to school, and two nearby nations have been chosen for cultural comparison. One of the nations where gender inequality in education persists, and appears to have been growing after the EFA declaration, is Pakistan. Iran has made significant progress and has reduced gender gaps in schooling. Both nations share the cultural belief that women and girls should not act irresponsibly in public. To determine the education vector in accordance with fundamental culture, a survey of parents of school-age children was carried out in Iran and Pakistan (Kilani & Al-Qaryouti, 2016). Although the parents' attitudes towards girls were essentially the same in both nations, their views on the importance of education differed, even if the parents themselves lacked formal education. To overcome the sociocultural barriers they face in formal education, female students must have the will to succeed (Oppong et al., 2022). This highlights the importance of parental involvement in their children's education. As a result, there is a need for more research on the parental factors that encourage female students to complete their formal education.

Parenting styles are a well-documented family factor that influences the career choices of college students (Sovet & Metz, 2014). In general, parenting can be divided into two main styles: authoritative and permissive. Authoritative parents are both demanding and responsive, while permissive parents are accepting of their children's behavior without setting many expectations (Uji et al., 2014). A study by Uji et al. (2014) found a strong link between the authoritative parenting style and a female student's Career Decision-Making Self-Efficacy (CDMSE), though this effect was not observed in male students.

Sovet and Metz (2014) identified a substantial association between the authoritative parenting style and students' CDMSE among high school students in France and South Korea. Moreover, students from authoritative homes are associated with elevated academic success in college (Moon-Seo et al., 2021). Research indicates that college students derive greater benefits when parents employ an authoritative parenting style rather than a permissive approach. Parental attachment is a crucial determinant that affects the professional development of college students. El-Hassan and Ghalayini (2020) did a study with undergraduate psychology students to examine the correlations among the quality of attachment ties, attachment style, and career decision progress. Their findings revealed a significant association among professional Decision-Making Self-Efficacy (CDMSE), professional indecisiveness, and attachments to both parents and peers. The study indicated that both parental and peer attachment were significantly correlated with CDMSE; however, the impact of parental attachment was more pronounced than that of peer attachment among college students in Pakistan.

Based on several studies, the family has a significant impact on a student's career path. For instance, a 2015 study by Lee and Kim with Korean college students revealed a connection between parental attachment and increased career commitment. They found that a student's confidence in their ability to make career decisions (Career Decision-Making Self-Efficacy, or CDMSE) was a key factor in this relationship. In a similar vein, Wright et al. (2014) examined how attachment, CDMSE, social self-efficacy, and life satisfaction are linked in college students. Their research suggests that a secure attachment to parents can lead to stronger social support, which in turn boosts both CDMSE and academic self-efficacy. This indicates that a strong family bond is vital for a student's confidence in making career choices. Furthermore, parental expectations can also shape a student's professional journey. A 2023 review of existing literature by Sanders et al. on the influence of a person's family of origin on career development highlighted the profound effect family has on a student's commitment and decisiveness. They also noted that specific, especially unrealistic, parental expectations can actually hinder a child's career development.

A family can significantly support a student's career journey by fostering an open and encouraging environment built on mutual respect and independence. Sanders et al. (2023) found that in such a setting, family influence on a student's confidence in making career decisions (CDMSE) and career indecision becomes less of a concern. Additionally, a study by Chen et al. (2021) examined how environmental, cultural, and personal factors affect the career choices of 12 Asian American undergraduate students. Their findings revealed that family expectations were a major factor in the participants' decision-making processes.

Family support has been shown to be a major factor in how students make their career decisions. A 2015 study by Fouad et al. found that family support, among other things, significantly influenced students' career choices. This support primarily came in two forms: financial assistance for their education and emotional backing, which included encouragement and career-related conversations. Research also indicates that students who receive more family support regarding their professional paths tend to be more effective in exploring and deciding on a career (Chen et al., 2021).

A study of middle school students by To et al. (2022) found that both parental support and parental behavior were strong indicators of a student's confidence in making career decisions (CDMSE). However, the link between parental support and CDMSE was more significant than that of parental behavior. In a separate, more recent study, Metheny and To et al. (2022) examined a group of college students and discovered that a student's perception of family support had a considerable indirect effect on their CDMSE.

During their career development, students often research and plan to find opportunities and make well-informed professional choices. Family interactions are a key factor in a student's career development, influencing everything from career planning and exploration to identity and confidence in career decisions. A 2014 study by Sharma examined how family interaction patterns—defined by the quality of relationships, support for goals, and family organization—affected the career planning and occupational identity of adolescents living at home. The study found that the quality of parent-child interactions was a minor but still significant factor in shaping adolescents' attitudes toward career planning. Families are typically committed to their children's success and will do whatever it takes to achieve that. Parents often motivate their children to get good grades and perform well in extracurricular activities, and they continue to offer encouragement even when their child's performance isn't at its best. This encouragement is a vital form of emotional support for young people. Chen et al. (2022) found that parental encouragement is strongly linked to a student's self-efficacy, outcome expectations, and interest in math and science careers, which boosts their confidence in pursuing and succeeding in those fields.

Family relationships significantly impact a student's confidence in making career decisions (CDMSE). For example, a study of Italian students in a university preparatory program found that those with positive family relationships felt more confident in their ability to search for careers (Chen et al., 2022). This supports earlier research by Chen et al. (2022), which indicated that the quality of family relationships strongly predicts higher CDMSE scores in college students. While most studies show a positive connection between family characteristics and a student's career development, some research has found a negative one. For instance, Li et al. (2023) discovered that certain family characteristics, like family conflict, were negatively associated with CDMSE. Similarly, a study by Kim et al. (2022) examined the relationship between a student's learning goals and CDMSE, highlighting the moderating role of support from both the student's and parent's perspectives. The findings showed that students who viewed their parents as supportive had a strong link between their learning goals and CDMSE. Kim et al. (2022) also noted a crucial difference: what a parent considers supportive behavior might be perceived as pressure or a lack of support by the child.

In Kenya, familial pressure to follow particular career paths and elevated expectations can overshadow a student's personal aspirations (Kim et al., 2022). In a study examining career choices among technical college students, Kim et al. (2022) found that numerous individuals selected specific courses due to familial financial support, despite lacking interest or understanding in such areas. This situation arises due to the nature of familial support in Kenya, which typically encompasses financial assistance (resource availability) and social or emotional support (encouragement in professional pursuits) (Akosah-Twumasi et al., 2021). A multitude of pupils, devoid of financial resources to fund their education, may register in courses or programs aligned with their parents' occupational choices and inclinations. The collectivist cultural framework in Kenya influences family dynamics regarding children and determines the information, beliefs, and skills that are promoted or repressed (Akosah-Twumasi et al., 2021).

In many Asian cultures, choosing a profession is seen as a family matter, which means students' career decisions often reflect a balance between their own preferences and family expectations (Akosah-Twumasi et al., 2021). As a result, students from diverse cultural backgrounds might not fully benefit from career advice that focuses only on individual interests, since they often prioritize family goals over personal ones (Sue & Sue, 2003). Therefore, it's crucial to involve family members in career-related conversations for diverse populations (Chang & Figueiredo, 2015). Additionally, what is considered supportive family behavior can vary significantly depending on a person's cultural background (de Leeuw et al., 2020).

2.5 Gender on Enrolment and Completion Rates of Science, Technology, Engineering and Mathematics Students in Public Universities in Kenya

In this study, gender, the second independent variable, is defined as a socially constructed characteristic of an individual, reflecting how a person sees themselves in relation to specific jobs. Gender isn't just a biological trait but a social identity linked to certain occupations (Skinner, 2022). While sex is a genetic attribute, gender is acquired and shaped by a person's experiences in educational institutions, families, communities, and society (Skinner, 2022). People develop their gender identity based on the support or opposition they encounter in their social environments, which in turn shapes their views on what is considered gender-appropriate behavior. Both society and the family are key agents of socialization, influencing what jobs and professions are considered suitable for specific demographic groups. The family is seen as the primary source of these early socialization experiences for children (Skinner, 2022).

Social Cognitive Career Theory (SCCT) posits that gender is a personal variable that influences a person's work interests, decisions, and goals. Personal characteristics like gender and socioeconomic status directly affect an individual's job preferences and career aspirations (Skinner, 2022). The influence of gender on career behavior is shaped by the socialization experiences provided to boys and girls, including role models, gender-role socialization, stereotypes, and the availability of opportunities or resources for skill development. Gender differences in occupational development and behavior between boys and girls in Kenya are a result of varying socialization experiences influenced by family and societal factors (Omenge, 2015).

Gender-role socialisation and stereotypes emerge in both household and societal contexts, particularly inside educational institutions. Gender-role socialisation denotes the sociocultural experiences delivered to female and male children based on their gender. This usually appears as tasks and obligations allocated to children, including views about gender-appropriate conduct (Yi-Ching & Billingham, 2014). Families often raise sons and daughters differently, encouraging specific behaviors in boys that are not promoted in girls (Omenge, 2015). For example, female children are often praised for their intrinsic and community-focused values, while male children are praised for their extrinsic and agentic values.

Family influences gender differences in career paths through two connected factors. The first includes education, financial resources, role models, and opportunities for personal growth provided by the family. The second involves family processes, such as socialization experiences (e.g., gender-role socialization) and the dynamics of parent-child relationships, like attachment (Omenge, 2015). The messages, duties, and responsibilities assigned to students during their upbringing create a crucial foundation for how they view themselves in specific tasks (Sahusilawane et al., 2020), which ultimately shapes their confidence in their career-related abilities.

Betz and Hackett (1986) suggested that the primary factor influencing women's confidence in making career decisions (CDMSE) is the gender-role socialization associated with specific jobs. Sahusilawane et al. (2020) found that family gender-role expectations influenced decision-making among Asian Americans. Many students reported that their parents implicitly or explicitly suggested that certain professions, like nursing, would be appropriate for them based on their gender. Furthermore, one student noted that her parents had no specific job expectations for her because, as a member of a Japanese household, it was assumed she would get married, and nothing more was expected of her. In Kenyan households, domestic duties such as cooking, cleaning, and caring are mainly assigned to females, while tasks like mowing the lawn, hunting, and repairing furniture and electrical appliances are given to males (Sahusilawane et al., 2020).

Individuals of any gender who assume roles conventionally linked to the opposite gender may encounter mockery or ostracism from their respective communities. Gender role socialisation constrains women's contributions to a nation's social, economic, and political development (Odero, 2024).

The Kenyan school system provides unique educational possibilities for both genders. Numerous high schools divide pupils by gender, creating instructional environments solely for girls or boys. Co-educational schools are few, and when present, parents often choose single-sex institutions due to the enhanced performance of pupils in single-sex settings relative to those in co-educational contexts (Kachero, 2014). The superior performance of girls can be attributed to more autonomy, heightened self-assurance, and the ability to engage freely in group conversations without fear of male peers. Research indicates that children in single-sex schools attain higher academic achievement (Kachero, 2014); yet, they encounter distinct learning contexts relative to their counterparts in co-educational institutions. For instance, females are typically assigned to more art-oriented or social disciplines, such as home economics, whereas males are often presented with more technical topics, such as electrical engineering and construction. The gender-based streaming of high school pupils cultivates a gendered perspective on career goals and choices among them. Consequently, students at each university are restricted to the courses available, regardless of their preference for more technical fields. Consequently, pupils are afforded disparate opportunities to pursue jobs in science, technology, or the arts (Luo et al., 2023). As a result, pupils develop differing efficacy views; males often establish career efficacy beliefs in the domains of science and mathematics, whereas females generally cultivate career efficacy beliefs in artistic professions (Luo et al., 2023).

Gender influences career advancement via the availability of role models. Research demonstrates that role models profoundly influence individuals' job growth by affecting their career maturity, decision-making processes, and ambitions. Role models significantly influence women's career decisions in non-traditional sectors (Abdinoor, 2020). Abdinoor (2020) asserts that all Kenyan women surveyed identified role models as crucial motivational influences in their career aspirations within science, technology, engineering, and mathematics. The scarcity of female career role models in Kenya undoubtedly adversely affects the career self-efficacy beliefs and job choices of young college women (Abdinoor, 2020).

The accessibility of chances or resources for skill enhancement impacts women's employment choices. As children develop, parents often provide diverse opportunities for skill enhancement, impacted by gender. A father might solicit his son's assistance with automotive maintenance or the construction of a storage facility, whereas a mother may seek her daughter's aid in culinary preparation, garment making, or household cleaning. In all cases, female and male youngsters are provided with different opportunity to develop diverse skills. Thus, individuals gain information and abilities relevant to their experiences, thereby cultivating confidence in those activities, as long as they continue their efforts. As a result, individuals are inclined to pursue jobs that correspond with the abilities they have encountered or cultivated during their upbringing. In Kenya, families may prioritise the education of male children when faced with the financial costs of educating their progeny (Mueni et al., 2020).

This viewpoint stems from the cultural notion that allocating resources to women's education is an ineffective investment, as women are anticipated to marry and subsequently enhance the homes they enter; hence, their education is frequently restricted to maternal preparation (Mueni et al., 2020). Women internalise the cultural restrictions they face, which may negatively impact their confidence in job decision-making, unlike boys who do not suffer similar cultural impediments.

The aforementioned characteristics affect women's self-perception about specific jobs and surroundings. Perceptions affect the confidence of female students in pursuing specific vocations, consequently influencing their participation in these domains and potentially resulting in avoidance or misguided decision-making (Nsair, 2021). SCCT asserts that persons who recognise obstacles in specific jobs are less likely to pursue such career paths (Lent, 2019). Women who foresee potential role conflict may choose to forgo jobs that do not correspond with their family obligations (Nsair, 2021).

Moreover, if women foresee potential discrimination in certain jobs, they are inclined to eschew or exhibit a lack of confidence in pursuing those professions. The aforementioned effects profoundly affect women's self-efficacy views, which in turn guide their job preferences and potential profession selections (Lent, 2013). A recent study on women's careers highlights enduring gender disparities that affect women across many career development situations, hence constraining their vocational choices and hindering their professional achievement (Zacher et al., 2019).

Women face a variety of gender-related challenges that can hinder their career advancement. These obstacles include a lack of role models, gender-role socialization, educational and employment discrimination, lower self-efficacy, and disparities in pay and promotions, as well as the conflict between work and home responsibilities. A significant barrier to women's professional growth is their tendency to undervalue their own abilities, skills, and talents (Reuben & Zingales, 2014).

Many scholars have investigated the impact of gender on a student's confidence in making career decisions (CDMSE), with varied results. Some studies have found no link between the two, while others have noted inconsistencies in CDMSE (Zainal et al., 2019). Zainal et al. (2019) identified gender differences in CDMSE among Taiwanese individuals but not among American participants; specifically, Taiwanese women showed lower CDMSE than their male counterparts. This suggests that the relationship between culture and gender in CDMSE needs further examination, especially considering Mau's findings. A separate study by Zainal et al. (2019) on the influence of parental factors on the career development of middle school students found no significant difference in CDMSE based on gender.

While some research with Kenyan participants has explored the relationship between gender and various career attributes, there is a lack of current literature specifically on how gender impacts a student's confidence in making career decisions (CDMSE). A study on career aspirations among secondary school students in Kenya's Kisumu district found that female participants preferred careers in biological sciences, while males opted for physical sciences (Dodson, 2014). Dodson's (2014) study also found a gender-based difference in job decision-making among secondary school students in Kisumu Municipality, Kenya. A separate study by Chen et al. (2022) on young polytechnic students in Bungoma County, Kenya, highlighted the significant roles of gender and peer pressure in their career choices. Chen et al. (2022) concluded that gender and cultural influences from schools, society, and family support significantly affect the career decisions of Kenyan women in science, mathematics, and technology. These influences help foster the development of self-efficacy in scientific fields, which then impacts their career choices in these areas.

The familial structure in Kenya is patriarchal, indicating male dominance in most aspects (Khaguya, 2014). Women face constraints in acquiring and securing resources, hence perpetuating their subordination to men. The patriarchal framework facilitates the distribution of gender-specific roles and obligations. Women typically perceive themselves as accountable for child-rearing, familial responsibilities, and household tasks (Khaguya, 2014). Historically, Kenyan households considered women's education superfluous, as societal obligations did not necessitate it, focussing instead on the observation of other women fulfilling their responsibilities. As a result, women were urged to participate in events designed for their engagement. Women primarily obtained skills from their mothers, sisters, grandmothers, and aunts. Women's educational prospects were constrained, mostly consisting of teaching from female educators who focused on gender-specific material (Khaguya, 2014).

During Kenya's pre-colonial and colonial periods, women's education was often considered unnecessary since their societal roles did not require formal knowledge and skills. These historical barriers are key factors behind the gender issues that persist today. While Kenyan law now grants women equal rights to education and property ownership as men, inequalities in their access to education and resources still exist, particularly at the university level. This suggests that the goal of gender equality in education has not yet been fully realized (Kenya National Bureau of Statistics, 2014).

Gender, as a social construct, is deeply influenced by the environment in which individuals are raised, which in turn shapes their socialization experiences. Most research on the impact of gender on a student's confidence in making career decisions (CDMSE) has been conducted in Western countries, with no studies specifically in African nations. Given the cultural differences between Western countries and Kenya, it is crucial to analyze how gender influences the CDMSE of Kenyan students. Teacher expectations and curriculum, along with gender-role socialization, significantly affect students' choices regarding science, technology, engineering, and mathematics (STEM) fields. UNESCO (2022) asserts that instructors often and inadvertently involve boys more frequently in science and mathematics classes, therefore reinforcing the perception that these fields are primarily male-dominated. Textbooks employed in Kenyan secondary schools often portray males in dynamic, technological roles, while women are depicted in passive or domestic capacities, thus shaping students' views about suitable gender representation in STEM disciplines. The hidden curriculum's impacts discourage girls from engaging with science-related jobs and undermine their confidence in pursuing these paths.

Mentorship is recognised as an essential factor in enhancing female involvement in STEM fields. Mwangi and Kamau (2020) demonstrated that students who interacted with accomplished female scientists or engineers had increased perseverance in STEM programs and reported elevated career self-efficacy. Female teachers are under-represented in STEM fields at public universities in Kenya, restricting access to mentorship opportunities. The identified structural weaknesses highlight the necessity for intentional institutional initiatives to establish mentorship programs and implement inclusive teaching strategies that actively engage female students in STEM education.

2.6 Social Stereotypes Enrolment and Completion Rates of Science, Technology, Engineering and Mathematics Students in Public Universities in Kenya

Gender is a social category where stereotypes emerge early on. Preschool children often categorize themselves and others based on gender (Liben & Bigler, 2002; Renno & Shutts, 2015). Interactions with adults can encourage gender-typed behaviors as children develop an understanding of these categories (Ruble et al., 2006). By age two, children comprehend gender labels (Ruble et al., 2006), and soon after, they begin forming generalized ideas about gender categories, which leads to stereotypes (Mulvey et al., 2010). By two and a half, children start creating their own stereotypes about gender roles, jobs, and interests (Blakemore, 2003). Participants in a study recognized gender stereotyping (Miller et al., 2009). Implicit assessments show that gender biases continue through late childhood and adolescence, although overt prejudices decrease during middle childhood (Steffens & Jelenec, 2011; Wilbourn & Kee, 2010). The development of gender stereotypes in STEM has been a major focus of extensive research into their formation.

Gender preconceptions about competence in STEM significantly influence a person's involvement and motivation in these fields later in life. These gendered beliefs not only threaten women's career opportunities but also help explain why some women who enter STEM professions eventually leave them (Beasley & Fischer, 2012; Cundiff et al., 2013). Some evidence suggests that scientific aptitude may be inherently linked to gender, implying that men are naturally more likely to succeed in STEM (Mascret & Cury, 2015). Such preconceptions negatively affect women's self-efficacy in STEM fields and their professional motivation (Cundiff et al., 2013; Schuster & Martiny, 2017). Garriott et al. (2017) found that for adolescents, STEM stereotypes have a major influence on STEM self-efficacy, which then predicts their future career goals.

Children between the ages of three and five exhibit reduced endorsement for counter-stereotypical STEM career ambitions, such as a girl desiring to become an engineer (Mulvey & Irvin, 2018), indicating that these stereotypes begin to form in early life. Studies demonstrate that children aged six to ten years uphold the stereotype that mathematics is mostly linked to males, as shown by both implicit and explicit stereotype evaluations. Male participants have a greater identification with mathematics across both evaluation types (Cvencek et al., 2011). Meta-analytic research demonstrates no substantial performance disparity between girls and boys on mathematics aptitude assessments, which raises concerns (Lindberg et al., 2010). Preconceptions can result in the social exclusion of girls and women from childhood to adulthood, even in the absence of authentic differences in gender performance or capability (Wang et al., 2013).

Despite the early emergence of gender stereotypes in children, studies suggest that perceptions of gender roles have greater adaptability during middle childhood (Liben & Bigler, 2002). Children start to comprehend that, regardless of gender, individuals can occupy diverse roles. Nonetheless, the belief that "masculine" professions possess greater importance than "feminine" ones persists into middle childhood (Liben & Bigler, 2002). Examining these beliefs from early childhood to middle childhood is crucial. During early adolescence, gender views and behavioural flexibility evolve, marked by a significant rise in men's conformity to gender norms (Bartini, 2006). This study investigates gender stereotypes in STEM for the first time, taking into account the growing gender flexibility noted from early childhood to early adolescence. It was expected that male participants would demonstrate a higher conformity to STEM stereotypes than female ones, as evidence indicates that gender role intensification is especially prominent among males.

Saptarani and Purwianingsih (2019) contend that societal acknowledgement and appreciation of scientific knowledge, scientists, and science-related careers can affect interest in science. When scientific occupations offer substantial benefits, individuals are inclined to perceive them as desirable employment choices. Research suggests that sociocultural factors exert a greater impact on girls' decisions to pursue physics compared to boys, due to socio-cultural norms. Society frequently perceives physics and associated occupations as macho and demanding (Saptarani & Purwianingsih, 2019). Saptarani and Purwianingsih (2019) examined the influence of stereotype threat on the academic performance of collegiate athletes. This study especially examined negative perceptions associated with academic performance. The study's findings indicated a negative association between participants' confidence in the significance of athletic skill in college admissions and their academic achievement. The findings demonstrated that negative stereotypes considerably affected the intellectual performance of a behaviourally defined cohort in a higher education setting. A 2010 research by the Education, Audiovisual and Culture Agency (EACA) analysed the policies enacted and the prevailing circumstances across Europe. The study focused on gender inequalities in academic outcomes. The study revealed that, alongside the injustices associated with gender stereotyping, educational differences based on gender are likely to impede economic progress and social participation. Statistics indicate that women represent a minority in mathematics, science, technology, engineering, and mathematics; nonetheless, males are more often recognised as the least proficient in reading skills. The findings underscore the necessity of considering gender differences in education when formulating policies and measures to enhance educational attainment. The study revealed that educators' conceptions of masculinity and femininity substantially affect their interactions with students and are crucial in promoting gender parity in educational settings. Gender-based stereotypes may be either reinforced or mitigated by the textbooks and reading materials provided in educational institutions (Brussino, 2022).

A study by Fisher (2022) indicated that students from both science and non-science disciplines agreed that science has a male image. The t-test results revealed no significant disparity in the sub-scale means. The representation of female scientists in Nigeria has been significantly inadequate. The representation of science as a male-dominated field is evident in the design, guidance, and assessment of the scientific curriculum. The role of science and mathematics textbooks is as significant in perpetuating a masculine representation of science, as their pictures generally depict male people, and the problem sets typically emphasise male-centric mechanical and outdoor contexts. Women were conventionally portrayed in clichéd roles, such as homemakers, assistants, or onlookers. Although most publishers strive to exclude sexist stereotypes and references from their publications, it will likely require years, even with extensive campaigns, to transform this masculine image.

Stereotypes concerning gender and professional roles profoundly influence students' academic choices and their perseverance in STEM disciplines. In Kenya, societal norms often designate technical and scientific positions as masculine, while nurturing or caregiving roles, such as nursing or teaching, are predominantly linked to women. These narratives are bolstered by media, educational institutions, and religious and communal communications. As a result, girls demonstrating an interest in STEM disciplines may encounter isolation or discouragement from peers, educators, or family members.

Stereotype threat can negatively impact performance and self-efficacy, as individuals may underperform owing to the fear associated with reinforcing unfavourable preconceptions.

Spencer et al. (1999) discovered that a woman's performance on arithmetic assessments dramatically deteriorated following exposure to negative preconceptions, despite her real proficiency being high. Psychological disengagement, defined by pupils distancing themselves from the subject matter, may also result from this threat. This leads to decreased confidence, increased dropout rates, and poorer classroom participation for women in STEM disciplines. Improving gender equity in STEM education requires measures that alleviate stereotype threat, such as promoting visible female role models, employing inclusive language in educational environments, and acknowledging students' competencies.

2.7 Career Decision-Making Self-Efficacy on Enrolment and Completion Rates of Science, Technology, Engineering and Mathematics Students in Kenyan Universities

Confidence in career decision-making (CDMSE) represents how much a person believes they can effectively perform the tasks necessary for making career choices (Mohd & Ahrari, 2020). This idea is based on Bandura's (1977) theory of self-efficacy, which is the belief in one's own ability to carry out tasks, overcome challenges, and reach goals. Unlike self-esteem or self-concept, self-efficacy is specific to a particular area or activity (Brown & Lent, 2019; Lent & Brown, 2019).

Self-efficacy is specific to a particular area, which can include mathematics, science, or career searching. This study will focus on self-efficacy related to career decision-making. People can develop and change their self-efficacy through four main sources: past performance, observing others, social encouragement, and psychological responses (Bang & Reio, 2017; Ng & Lucianetti, 2016). Of these, past performance is the most influential because it is based on direct experience (Bang & Reio, 2017). Self-efficacy significantly affects a person's decision-making, the effort they put into tasks, and their perseverance when faced with obstacles (Achtziger & Gollwitzer, 2018). It also has a profound influence on personal actions and behavioral changes (Wang et al., 2022). Individuals who believe they are good at tasks like making career decisions are more likely to put in a lot of effort. This perspective helps them overcome challenges related to career choices and ultimately leads to greater professional success.

Conversely, individuals frequently refrain from making professional judgements when possible and exert minimal effort otherwise, influenced by their beliefs about their ineffectiveness regarding specific tasks, such as career decision-making (Lent, 2013). Komarraju et al. (2014) identify CDMSE as an essential element in career development, garnering significant focus in career literature. Since its inception, CDMSE has been analysed in relation to various phenomena, including socioeconomic status (Hsieh & Huang, 2014), gender and ethnic disparities, acculturation and social support, commitment to career choices (Ye, 2014), family interaction patterns, career exploration, career indecision, career maturity, and vocational identity. Research indicates that CDMSE correlates positively with academic contentment, professional maturity, occupational identity, career exploration, career commitment, decisiveness, and self-esteem (Choi et al., 2012). Conversely, research indicates a negative correlation between CDMSE and factors such as gender, fear of professional commitment, and career indecision (Lam, 2016). Research indicates that CDMSE is an essential and relevant construct in the professional development of persons, especially among college students.

Despite its tremendous importance in the professional development of college students, CDMSE has not garnered substantial attention from career development scholars in Kenya. Murphy's (2020) study on visually challenged children was the first in Kenya to investigate confidence in making career decisions (CDMSE). The research found a significant positive link between a student's vocational self-concept and their CDMSE. Additionally, a mother's educational achievement was shown to significantly improve a student's CDMSE, and no gender differences were found in the results. Since CDMSE is a construct that can change based on life events and environmental factors, such as family support (Lent, 2020), this study will explore how family support and gender affect the CDMSE of university students.

The family is considered the main influence on a person's career choices (Kiprono, 2017). Important career decisions are often made and carried out within the family context, where individuals also form their professional identities, views, and goals, as well as family expectations (Kiprono, 2017). Families help young people learn through role modeling, which supports their career exploration and interest-driven behaviors (Kiprono, 2017). In this study, the first independent variable, family support, is defined as any kind of assistance—informational, emotional, or financial—that a student receives from family members, such as parents, guardians, siblings, or extended relatives, that helps them with their career decisions (Fouad et al., 2015).

While various elements, including personality, socioeconomic status, peer influence, educational context, and racial and ethnic identity, impact the CDMSE of college students, familial views and opinions are essentially crucial (Subhrajyoti, 2023). Family members' attitudes and ideas serve as agents of socialisation, influencing individuals' internalisation throughout their development. A family's beliefs and viewpoints can influence a person's confidence in making career decisions, which may, in turn, affect their future career choices (Lent, 2020). This study will examine gender as the second independent variable, defining it as the biological state of being male or female. Although the Social Cognitive Career Theory, which is the theoretical foundation for this study, views gender as a social construct shaped by a person's life experiences, this research will use a biological definition (Lent, 2020).

This study will investigate differences in gender identity by allowing participants to self-identify as either male or female. Research indicates that the career choices of young adults, especially college students, are more often shaped by family influences than by their individual traits (Fan et al., 2014). Studies on confidence in making career decisions (CDMSE) have explored various family characteristics, including parental relationships, parenting styles, socioeconomic status, family expectations, and overall family support (Boo & White, 2014; Metheny & McWhirter, 2013; Sovet & Metz, 2014). All referenced research demonstrated a significant correlation between family variables and CDMSE. A multitude of research studies has produced diverse results about the relationship between gender and CDMSE. Multiple studies indicate an absence of correlation between these two constructs (Mitsopoulou et al., 2024). Mitsopoulou et al. (2024) identified differences in gender and professional Decision-Making Self-Efficacy (CDMSE) among Taiwanese participants, which were not present in American participants, when investigating the cultural implications of professional decision-making style and CDMSE. Mitsopoulou et al. (2024) found no gender differences in CDMSE among visually impaired students in Kenya.

This study will investigate differences in gender identity by allowing participants to self-identify as either male or female. Research indicates that the career choices of young adults, especially college students, are more often shaped by family influences than by their individual traits (Fan et al., 2014). Studies on confidence in making career decisions (CDMSE) have explored various family characteristics, including parental relationships, parenting styles, socioeconomic status, family expectations, and overall family support (Boo & White, 2014; Metheny & McWhirter, 2013; Sovet & Metz, 2014). Research on CDMSE from non-Western countries, particularly in Africa, is limited. Benito-Gomez et al. (2020) investigated the assessments of support from students and parents, suggesting that the understanding of supportive behaviour may differ between cultures. This discovery underscores that familial impact is contingent upon various cultural and societal contexts.

Cultural societies can be categorised as individualistic or collectivist. Many Western nations, characterised by extensive career development research, are classified as individualistic cultures. In contrast, non-Western or developing nations, such as Kenya, are identified as collectivist cultures (Kiprono, 2017). In individualistic cultures, individuals perceive themselves as autonomous, leading to job decisions that are personal choices. Conversely, individuals in collectivist cultures view themselves as interconnected, prioritising the interests of the larger collective over their personal ones (Ozek & Ferraris, 2020). Family influence differs between cultural civilisations; for example, in individualistic cultures, families typically grant children autonomy in job decisions and play a substantial role in their overall professional development (Dai et al., 2022).

In collectivist cultures like Kenya and several Asian nations, numerous young individuals prioritise familial goals over personal ambitions, resulting in little autonomy in making autonomous career choices. Consequently, families are progressively shaping their children's career decisions and development, rather than concentrating exclusively on the individual traits of the children (Fan et al., 2014). Consequently, students' perceptions of familial support may differ between cultures (Fan et al., 2014).

The family significantly impacts children's CDMSE, particularly regarding gender. Research indicates that individuals typically prefer career trajectories aligned with the preferences of their families, classmates, or educators, rather than pursuing their own interests (To et al., 2022; Tsakissiris & Grant-Smith, 2021). If a family conditions a person to see certain careers as either masculine or feminine, this process known as gender-role socialization can affect the person's confidence in making career decisions (CDMSE). This happens because of beliefs instilled during childhood within the family environment. Gender-role socialization is a form of reinforcement from important people, like family members, based on a shared set of expectations about the characteristics deemed appropriate for a child based on their gender (Tang et al., 2021). Gender-specific support may result in students pursuing traditional occupations feeling, or believing they are receiving, enhanced familial support (Lv et al., 2022), potentially influencing their Career Decision-Making Self-Efficacy (CDMSE) compared to those involved in non-traditional programs. Students in non-traditional programs often encounter a lack of positive reinforcement and parental support, as their chosen courses may deviate from societal standards regarding gender or socialisation experiences (Shin et al., 2015).

In Kenya, recognised as a collectivist cultural community (Onyango, 2017), familial influence may affect college students' self-efficacy in vocational decision-making differently than in other nations. Diversity among ethnic groups may arise from geographical, cultural, historical, economic, and social disparities within and between nations (Oburu, 2024). It is essential to assess the CDMSE of students from impoverished countries, such as Kenya. The proposed research is justified by cultural differences, a lack of job prospects, inadequate career education and development, an increase in the number of universities, and a rise in student enrolments. Examining the CDMSE among Kenyan university students is essential for comprehending influential elements such as gender, parental support, and social biases. CDMSE is essential in influencing students' choices and resilience in STEM disciplines. CDMSE, grounded in Bandura’s (1986) social cognitive theory, pertains to an individual's self-efficacy in executing effective career-related decisions. Research indicates that students possessing elevated Career Decision-Making Self-Efficacy (CDMSE) are more inclined to engage in comprehensive career exploration, strategic planning, and effective problem-solving to attain their goals (Lent et al., 2002). In Kenya, students' self-efficacy in professional decision-making is influenced by academic preparation, access to employment information, and societal expectations.

The absence of organised career guidance programs in secondary and postsecondary institutions has been identified as an impediment to promoting effective Career Development and Management Skills Education (CDMSE) among students (Wekesa & Kitainge, 2022). In the absence of a clear understanding of STEM careers and their associated educational paths, students may choose more known or socially accepted subjects, despite having interests and abilities in science and technology. Furthermore, gendered expectations may undermine CDMSE in girls, leading them to internalise uncertainties regarding their appropriateness for scientific and technical positions. Improving CDMSE necessitates interventions at various levels, including mentorship, curriculum modifications, and family engagement, to strengthen students' confidence and clarity in pursuing and completing STEM courses.

2.8 Theoretical Framework

This study will use the Social Cognitive Career Theory (SCCT), a framework created by Lent, Brown, and Hackett in 1994 for adolescents and young adults. Rooted in Albert Bandura's (1986) Social Cognitive Theory (SCT), SCCT emphasizes the central role individuals play in their own career decisions. It also looks at internal and external factors that can either strengthen or weaken a person's sense of personal agency their belief that they can initiate, execute, and control their own actions. SCCT explores three key, interconnected parts of professional development: how career interests are formed, the process of making academic and career choices, and the achievement of success (Wang et al., 2022). All of these themes are explained through three core components of the theory: self-efficacy, outcome expectations, and goals (Adebusuyi et al., 2022; Mohd & Ahrari, 2020).

This section analyses theoretical frameworks for perseverance, highlighting Social Cognitive Theory and the development of self-efficacy in students. Social Cognitive Theory posits that individuals actively engage in their own lives instead than only observing. The factors that promote persistence are dynamic and always developing (Bandura, 1999). Social Cognitive Theory and its derivative, Social Cognitive Career Theory, elucidate the elements that initially attract students to STEM disciplines and those that affect their retention post-graduation. The two perspectives are closely linked to self-efficacy theories, which assert that a student's perceived competence is influenced by personal characteristics and that success expectations mostly rely on previous performance (Simon et al., 2015). Social Cognitive Theory emphasises the significance of strong role models, illustrating the shift from teacher-centered education, where educators are the primary sources of knowledge, to a more intricate and interactive relationship between students and teachers. Colleges are using flipped classrooms, peer learning, problem-based learning, cooperative learning, and experiential learning as expressions of this student-centered approach (Carrino & Gerace, 2016).

This learner-centred pedagogical approach relies on educators acting as mentors and role models. The effectiveness is particularly apparent when linked to STEM-related job and skill-development programs, which can significantly influence students' career aspirations (Liu et al., 2014). Theories of Persistence within Social Cognitive Theory Albert Bandura's social learning theories, which analyse the influence of beliefs and cognition on career decisions and emphasise the importance of self-efficacy in performance, constitute the basis of social cognitive theory (Liu et al., 2014). Bandura (1999) contends that social forces represent the primary source of the self and can profoundly influence individual students' academic performance. Students' self-efficacy and career decision-making are significantly influenced by familial dynamics, peer relationships, and the support from mentors and educators (Xing & Rojewski, 2018). A strong sense of self-efficacy improves the identification, formation, and maintenance of social connections, enabling individuals to effectively manage obstacles. Bandura (1999).

Students' social ecosystems require development and maintenance through traditional social networks and connections with academic programs (Carrino & Gerace, 2016). Beliefs in self-efficacy can influence students' interests, with job training, mentorship, and technological exposure serving as potential factors for either improvement or decline (Lent et al., 2002). Liu et al. (2014) established a correlation between students' exposure to engineering role models and the strength of their gender role perspectives. This factor significantly influenced women's self-efficacy in STEM and their commitment to engineering professions. A significant association exists between the technical education provided by STEM programs and the career trajectories that this education enables for students. Industry-standard products such as Adobe Photoshop and Adobe Illustrator exemplify benchmark accomplishments in Graphic Design programs within Communications Technology CTE degrees. Upon graduation, businesses utilise these programs for internships and associated employment sectors; hence, proficiency in them while college is crucial for career advancement. Social cognitive career theory seeks to elucidate the processes underlying academic and career decision-making, as well as the manifestation of achievements stemming from these decisions. This theory represents a significant enhancement of social cognitive theory, particularly through its integration of STEM and vocational training (Lent et al., 2002). Graduation necessitates proficiency in essential skills; nevertheless, creativity also contributes to attracting students to STEM disciplines and careers. Lent et al. (2002) assert that individuals' environments should provide direct, vicarious, and engaging experiences that foster strong efficacy beliefs and positive outcome expectations, hence encouraging the development of interests in promising fields.

STEM programming, known for its versatility and diverse range of majors and career opportunities, appears to provide numerous pathways for engaging female students and improving their retention. To effectively promote skill mastery and sustained engagement in programs, these options must be consistently approved and linked to achievable challenges. Davis, 2014. Lent et al. (2002) investigate a self-efficacy "feedback loop," demonstrating the convergence of social cognitive career theory and self-efficacy. This cycle transpires when a student takes pleasure from an activity and thereafter seeks to enhance their participation and engagement in it. This enhances their proficiency in the activity and their expectations of success, hence leading to greater time commitment, dedication, and engagement with the activity. Students can develop their talents through majors and professional paths aligned with their interests, and STEM provides similar opportunities for advancement. This results in measurable skill enhancement and, more specifically, positive grades and progression within the program.

Self-efficacy can explain why some students are more interested in, engaged with, and successful in activities where they feel confident. Students who doubt themselves may withdraw or give up, while those with strong self-efficacy tend to increase their efforts when faced with challenges (Bandura, 1999). R. A. Simon et al. (2015) state that self-efficacy boosts effort, perseverance, and resilience. Believing in your abilities can help you set ambitious but achievable goals. These goals, in turn, facilitate skill development, which further enhances self-efficacy (Lent et al., 2002). According to Bandura (1999), the satisfaction from mastering an activity acts as a reward, encouraging the pursuit of more goals. Lent et al. (2002) also point out that self-efficacy beliefs are dynamic, growing in supportive environments and shrinking when faced with barriers. Increased self-efficacy can help female students choose college majors in male-dominated fields, as confidence significantly impacts their ability to stick with a program and overcome obstacles (R. A. Simon et al., 2015). Ultimately, a student's belief in their own effectiveness greatly influences their choice of tasks, how much time and effort they put in, and their persistence in overcoming challenges (Bandura, 1999).

The perceptions of gender norms among women can influence their educational experiences and their acceptance of male-dominated professions. Simon et al. (2015) identified accomplishment objectives and self-efficacy attitudes as critical factors influencing perseverance and performance among female students within STEM fields. Yang and Carroll (2018) contend that women in STEM programs, traditionally male-dominated, face discrimination, hostile rhetoric, and micro-aggressions, which may diminish their self-efficacy. Individuals with high efficacy demonstrate increased resourcefulness in overcoming problems and effectively managing their situations (Bandura, 1999). Students can employ goal-setting, motivation, and expectation management to improve their self-efficacy. Inspiration and Goal Setting Goal setting improves student focus on specific objectives, serving as a valuable instrument for analysing the elements that lead to their successes or failures. Increasing research suggests that personal goals offer a framework for understanding and responding to situations (Dweck & Leggett, 1988).

Individuals' objectives frequently align with their capabilities and anticipated outcomes. The achievement of these goals directly influences their self-efficacy and outcome expectations

(Lent et al., 2002). Simon et al. (2015) assert that mastery goals can alleviate the detrimental effects of gender stereotypes by enhancing motivation, engagement, deep learning, and perseverance. Establishing personal goals and subsequently evaluating success in relation to those goals is an essential component of personal motivation. Goal-setting essentially cultivates personal dedication to an undertaking. Fulfilment arises from self-assessment following the attainment of objectives (Bandura, 1999). The concept of motivation, akin to goal-setting, may elucidate the reasons for children's hesitance or their involvement with challenges. Bandura (1999) defines motivation as the belief that a given activity will provide outcomes considered valuable by the individual. Dweck and Leggett (1988) identify two types of motivation: the "helpless" response, characterised by students' avoidance of challenges and a subsequent decline in performance, and the "mastery-oriented" response, in which students actively seek challenges and maintain performance levels despite experiencing failure. Students who set objectives to develop their talents exhibit better coping and resilience results than those who aim to display their abilities. This presumption of effectiveness may influence students' ability to manage stress and problems. Dweck and Leggett (1988) assert that pupils who view intelligence as fixed tend to embrace performance goals, whereas those who consider intellect as malleable are more likely to seek learning goals. Highly motivated individuals can mitigate stress and anxiety by excellent management of their environments (Bandura, 1999). Simon et al. (2015) contend that student perseverance is associated with individual self-efficacy, personal performance objectives, perceived institutional support, and potential for success in STEM careers. Saint Mary's College in Indiana experienced a perception problem among its female students, leading to hesitance in enrolling in computer programming courses (Broad & McGee, 2014). The college implemented many strategies to enhance female students' self-efficacy in computer science and information systems courses. These included the development of woman-centered curricula, the integration of computer science and information systems into General Education courses, the elimination of prerequisite courses for computer programming, the facilitation of student-tailored projects, and the encouragement of amicable and collaborative campus environments. Broad and McGee (2014) contend that joint efforts in active, in-person recruitment have been helpful, particularly in increasing female student enrolment in computer programming courses.

To enhance college readiness, educational institutions have focused on classroom engagement and the establishment of learning communities, while also striving to refine transition models from secondary to higher education. The establishment of a communication framework among students, instructors, staff, and STEM professionals improves relational learning and contributes to the development of students' identities (Carrino & Gerace, 2016). Mau (2016) reports analogous findings about the formation of informal support groups, which may offer students motivation to enhance self-efficacy. Bandura (1999) posits that individuals with high self-efficacy are more likely to choose from a broader spectrum of careers and areas, pursue training for those selections, and sustain their dedication to these domains over extended periods when confronted with challenges.

2.9 Conceptual Framework

A conceptual framework visually outlines the proposed relationships among a study's variables. This research is organized around dependent, independent, and intervening variables. The independent variables include socioeconomic factors, such as social stereotypes, family background, and Career Decision-Making Self-Efficacy (CDMSE). The dependent variables are the enrollment and completion rates of graduates in science, technology, engineering, and mathematics (STEM). The intervening variables, which include government education policies and industry input in curriculum development, will be managed by selecting public universities with similar STEM programs.

This study's conceptual framework uses the Social Cognitive Career Theory (SCCT) to explore the main variables that affect gender disparities in STEM education. The model focuses on career self-efficacy, which is influenced by personal factors like gender identity, environmental supports such as family encouragement, and contextual barriers like stereotypes and financial limitations. Together, these factors shape a student's career interests, decisions, and persistence.

The framework suggests that family support directly affects CDMSE by providing emotional, informational, and material resources, whereas social stereotypes function as contextual barriers that diminish confidence and restrict perceived career options. Gender, understood not solely as a biological category but as a socially constructed identity, mediates the influence of these factors by shaping how students internalise and respond to societal expectations. Ultimately, enrolment and completion in STEM courses are regarded as outcomes that demonstrate the cumulative effects of these variables over time. This framework directs the research design and interpretation of findings by emphasising the interplay between individual agency and structural influences in shaping educational trajectories in STEM.

The relationship is illustrated in Figure 2.1 below.

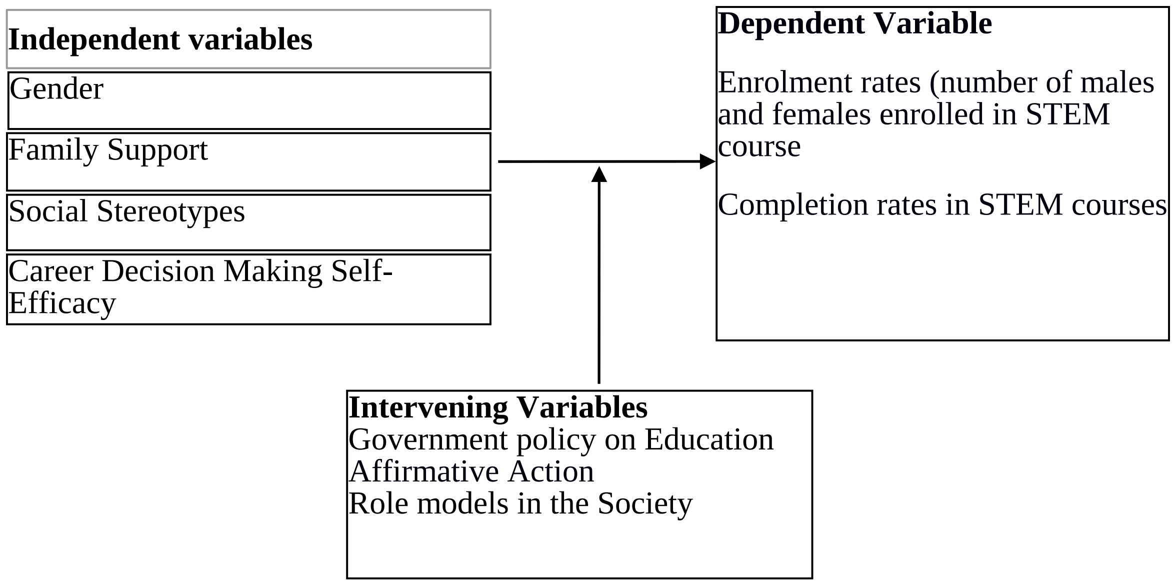

Figure 2.1 Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology used in this study. It includes the research design, the study population, the sampling procedure, and the research instruments. The chapter also explains the procedures for pilot testing, data collection, and data processing and analysis. Finally, it outlines how the results of the analysis will be presented.

3.2 Research Design

According to Kothari (2004), a **research design** is the blueprint for gathering, measuring, and analyzing data. This study used a **correlational survey research design** to examine the relationship between variables without the need for the researcher to control or manipulate them. A correlation shows both the strength and direction of the relationship between two or more variables, which can be either positive or negative (Johnson & Christensen, 2024). The correlational design was the most appropriate method for this study due to its specific advantages in this type of analysis.

3.3 Area of Study

The study was conducted at three of Kenya's public chartered universities: Egerton University, Jomo Kenyatta University of Science and Technology, and the University of Nairobi. These institutions were selected for their wide range of courses in science, technology, engineering, and mathematics (STEM). Each university has at least seven faculties or schools dedicated to these fields, including Health Sciences, Engineering, Pure and Applied Sciences, Computer Science, Agricultural Sciences, Education, Environmental Science, and Building, Construction, & Architecture.The universities were chosen for being among Kenya's oldest, with sufficient resources and capacity. Their courses are also accredited and approved by Kenyan regulatory bodies. Egerton is in Nakuru County, Jomo Kenyatta University is in Kiambu County, and the University of Nairobi is in Nairobi County. According to the Kenya Education Review (2015), these specific institutions were chosen because their established and highly regarded STEM programs attract a large number of students. The study focused on public universities over private ones to avoid a bias towards economically privileged students, which would not have been a balanced representation of STEM students across the country.

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3.4 Population

According to Kothari (2004), the target population is the group to which a study's findings are meant to apply. For this research, the target population consisted of undergraduate students in STEM courses at the University of Nairobi, Jomo Kenyatta University of Agriculture and Technology, and Kenyatta University. Deans, department chairs, and admissions officers from the relevant schools and faculties were also included as key informants. These universities were chosen because they are among Kenya's oldest, are well-resourced, and offer accredited courses approved by various Kenyan regulatory bodies. The three institutions also met specific selection criteria, including being operational during the implementation of the 2010 Kenya Education Sector Support Programme (KESSP I) admission policy. This policy, as noted by UNESCO (2010), was designed to achieve a 50% enrollment rate in science and technology. The universities were also selected for their strong foundation in science and technology, demonstrated by high enrollment and a wide range of STEM bachelor's programs. Each institution has at least seven faculties or schools, including the Faculty of Health Sciences, Engineering, Pure and Applied Sciences, Computer Science, Agricultural Sciences, Education, Environmental Science, and Building, Construction & Architecture.

Table 3.1

Target Population

Enrolment	2018/2019 academic year to 2023/2024 academic year		
Programme	Egerton University	Jomo Kenyatta University of Science and Technology	University of Nairobi
Health sciences	2350	6700	9200
Environmental science	340	680	1300
Education	6700	-	7200

science			
Applied and pure sciences	4234	5210	8978
Agricultural sciences	720	2450	4850
Engineering & survey	495	6780	7800
Building, construction architecture	-	2300	8970
Computer sciences	2300	6720	7920
Totals	17139	30840	56218

Source: Kenya Universities, Colleges and Central Placements Enrolment report, 2023

3.5 Sample Size and Sampling Procedures

Sampling involves choosing a specific number of subjects from a broader population to create a representative group for a study (Orodho, 2004). In this research, we used purposive sampling to select the universities. This method requires the intentional selection of participants who can offer valuable insight into a particular theme, concept, or phenomenon. It is often used in studies with small sample sizes where a researcher first establishes specific selection criteria before choosing the sample (Patton, 2002). Following this approach, we purposively selected three out of the 35 chartered public universities, all of which were established before 2007. A stratified random sampling method was then employed to choose the students who agreed to complete the questionnaire. The different science programs served as the strata for this selection process. This method was chosen because it ensures every individual within the defined population has an equal and independent chance of being selected, which allows the resulting data to be generalized (Kombo & Trump, 2006). Student respondents were chosen from the first through fifth years, as their extended participation in

Science and Technology programs gives them a deeper understanding of the subject matter. Given the relatively large size of the study population, a sampling method will be used to determine the final number of participants. The sample size will be calculated using Nassiuma's (2008) formula, as shown below.

$$n = \frac{NC^2}{C^2 + (N - 1)\, e^2}$$

Where:

n = Sample Size

N = Target Population

C = Coefficient of Variation ($21\% \leq C \leq 30\%$),

e = Precision Level ($2\% \leq e \leq 5\%$)

Therefore;

$$n = \frac{143095 \times 0.3^2}{0.3^2 + (143095 - 1)\, 0.03^2}$$

n = 384

n = 384 respondents

Deans, Heads of Departments, and Academic Registrars were selected through purposive sampling. This technique involves a researcher intentionally selecting a specific group of individuals to serve as the basis for the study (Kombo & Trump, 2006). The Deans, Heads of Departments, and Academic Registrars served as primary informants knowledgeable about the issues under investigation in the study.

3.6 Instrumentation

This study used two methods for data collection: self-administered questionnaires and a key informant interview schedule. Using multiple methods to collect the same data helps address the limitations of a single approach, improves understanding of the issues, and increases the accuracy of the results (Jensen, 2011). This study integrated data from both methods into a single report. The use of these two instruments enhanced the depth and accuracy of the collected data and improved the understanding of how socioeconomic factors influence gender disparities in the enrollment and completion rates of science, technology, engineering, and mathematics courses at the selected public universities.

3.6.1 Questionnaire for student Respondents

This research used a questionnaire to collect data from 384 students in science, technology, engineering, and mathematics (STEM) programs. A questionnaire was a good choice because it helped minimize both the time and cost of the study. According to Creswell (2007), a questionnaire is a self-reporting tool used to collect specific information. Mugenda and Mugenda (2003) point out that questionnaires can ensure a high response rate and reduce bias by providing clear explanations and allowing for personal contact. Another key benefit of using self-completed questionnaires is the reduced cost and effort required for data processing and analysis, which also tends to produce more accurate results. The questionnaire was organized into distinct sections to collect different types of information. These sections included: Background Information; the Influence of Gender on Enrolment and Completion Rates; the Influence of Family Support on Enrolment and Completion Rates; the Influence of Social Stereotypes on Enrolment and Completion Rates; and the Influence of Career Self-Efficacy on Enrolment and Completion Rates.

3.6.2 Key informants interview schedules for Deans, Chairs of Departments and Academic Registrar

Interviews with key informants provided credible and in-depth responses that complemented the quantitative data from questionnaires and document analysis. According to Getu and Tegbar (2016), the interviewer used a flexible approach with open-ended questions to encourage discussion rather than a rigid question-and-answer format. These open-ended interviews, conducted with deans, heads of relevant STEM departments, and the academic registrar, provided key insights into the reasons for low student participation in science and technology programs. The key informant interview schedule was more insightful than other methods because respondents could share information from their own perspectives, and it allowed for the emergence of unexpected information. This method also made it possible to evaluate respondents' body language, facial expressions, and tone of voice (Chris et al., 2009). However, open-ended interviews can be time-consuming, especially with a large population (Noble & Smith, 2015).

3.7 Pre-Testing

Before collecting the main data, the researcher conducted a pre-test at Egerton University. Following Mugenda and Mugenda's (2003) advice, a minimum of 10% of the sample population, or ten students enrolled in science, technology, engineering, and mathematics courses, participated in the pre-test. This sample was not included in the final research population. The participants were selected using stratified random sampling to ensure equal representation from each category of science courses. The pre-test helped the researcher establish the study's validity and reliability. According to Bryman (2004), a test's validity is determined by how well it measures the intended subject matter. The study focused on both face validity and content validity. After the pre-test, the Cronbach's Coefficient Alpha (K-R) 20 formula was used to estimate the instrument's reliability. A correlation value of 0.7 or higher indicates that the test items produce consistent results, which describes the test's internal consistency. This falls within the acceptable range for reliability testing (Bryman, 2004).

3.7.1 Validity

According to Mugenda and Mugenda (2003), internal validity measures the extent to which a study accurately identifies a variable as the cause of a specific effect. It reflects how well a study has controlled for irrelevant factors. The instrument's external validity demonstrated that the conclusions were suitable, significant, and relevant to the target population (Creswell, 2014). Every validity assessment is a subjective opinion based on the researcher's judgment (Orodho, 2003). The data collection instruments were validated by certified experts from the Institute of Women and Gender Studies.

3.7.2 Reliability

According to Mugenda and Mugenda (2003), reliability is the extent to which a research tool produces consistent results after being used multiple times. The researcher's pre-testing helped evaluate the clarity of the test items and allowed for the modification of any that were unclear or insufficient, thereby improving the overall quality and dependability of the research instrument.

Table 3.2 indicates the reliability analysis results.

Table 3.2

Reliability Analysis Results

Variable	Cronbach's Alpha	No. of items
Family support	.696	10
Social stereotype	.864	14
Career self-efficacy	.899	8

Enrolment	.756	6

Results show that family support had a Cronbach's Alpha of 0.696. Additional findings are that social stereotype had a Cronbach's Alpha of 0.864, career self-efficacy had 0.899 and enrolment had 0.756. Overall, the values were above 0.70 threshold around which research instruments show the presence of high internal consistency (Bryman, 2004).

3.8 Data Collection Procedures

Following board of postgraduate studies clearance, a research permission was requested from the National Commission for Science, Technology & Innovation (NACOSTI). This made it possible for the researcher to gain support and collaboration from the staff members of some public universities who serve as vice chancellors and alumni. Additionally, it made it simple for the researcher to obtain the desired sample size in the research areas. Through the office of the dean of students, who assisted in identifying the student participants, appointments for visits were scheduled in advance with the target subjects. Enrolment information was obtained from the program administrators' offices for the respective universities.

3.9 Ethical Issues

Several ethical considerations were taken into account during data collection. The researcher followed the proper procedures, including obtaining necessary consent from the administrations of the universities where respondents were selected. The researcher also avoided asking for sensitive information that could make respondents feel uncomfortable, such as their specific age. Instead, the research instrument was designed to collect data in categories. Furthermore, respondents were not required to provide their names or disclose their institution's identity. This approach encouraged respondents to participate more willingly and provide the requested data.

3.10 Data Analysis

Data processing and analysis were performed using version 22 of the Statistical Package for Social Sciences (SPSS), including only questionnaires that were completed correctly. The analysis used both descriptive and inferential statistics. Descriptive statistics included measures of distribution, central tendency, and variation. For inferential analysis, regression analysis was used to achieve two main goals: to predict the value of one variable based on another and to explain the reasons for observed differences (Huck, 2012). Regression analysis examines the relationships between a dependent variable (Y) and one or more independent variables (X) (Muijs, 2011). In the regression equation, Y represents the dependent variable, while X represents the independent variable. Regression analysis is divided into two main types: simple and multiple regression. A simple linear regression includes one dependent variable (Y) and a single independent variable (X), represented by the equation $Y=a+bX$. Here, Y is the dependent variable's raw score, 'a' is the intercept, 'b' is the regression coefficient, and 'X' is the independent variable's raw score. The value of 'b' is crucial because it explains the contribution, weight, or significance of the independent variable to the dependent variable. The values of X and Y are expected to change in direct relation to the value of 'b' (Nardi, 2006). Multiple regression analysis involves one dependent variable (Y) and two or more independent variables (X), represented by the equation $Y=a+b1X1+b2X2+...+bkXk$. This is a widely used statistical method in educational research because it can analyze different types of data (ordinal, interval, or categorical), can be applied to various research designs (causal-comparative, correlational, and experimental), and provides estimates for both the magnitude and statistical significance of relationships between variables (Gall et al., 2007). When conducting multiple regression analysis, researchers must carefully select which variables to include in the model. The results are typically summarized using the values of R and R^2. R measures the correlation between the predicted and actual scores, while R^2, or the coefficient of determination, indicates the proportion of the variability in the dependent variable that is explained by the independent variables (Huck, 2012). Table 3.2 provides a summary of all the data analysis procedures.

Table 3. 3 Data analysis matrix

Hypothesis	Independent variable	Dependent variable	Data analysis technique
H01: Gender difference has no significant influence on enrolment of students in STEM oriented courses in selected public universities in Kenya.	Gender	enrolment and completion rates of students in STEM oriented courses	Mean, standard deviation, frequencies, Independent T-test
H02: Family support has no significant influence on enrolment of students in STEM oriented courses in selected public universities in Kenya.	Family support	Enrolment and completion rates of students in STEM oriented courses	Mean, standard deviation, frequencies, simple regression
H03: Social stereotype has no significant influence on enrolment of students in STEM oriented courses in selected public universities in Kenya.	Social stereotype	Enrolment and completion rates of students in STEM oriented courses	Mean, standard deviation, frequencies, simple regression

H04: Career self-efficacy has no significant influence on enrolment of students in STEM oriented courses in selected public universities in Kenya.	Career self-efficacy	Enrolment and completion rates of students in STEM oriented courses	Mean, standard deviation, frequencies, simple regression

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This section presents the data analysis outputs. It covers the response rate, and then proceeds to present the background information on respondents, all in descriptive statistics (mode-frequency). It also covers the descriptive statistics per the study objective where it presents the mean, standard deviation, minimum and maximum values. Inferential statistics that include independent sample test, simple and logistics regression results are also covered to aid in answering the research hypotheses.

4.2 Response rate

Table 4. 1

Response Rate

	Frequency	Percent
Complete	342	89.1
Incomplete	42	10.9
Total	384	100.0

In social research surveys, several rates have been proposed to be acceptable response rates. For instance, Luo (2020) proposes 50%, Ali et al. (2021) suggest a range of 30 -70% while Sataloff and Vontela (2021) states that it should be at least 70%. Therefore, as observed in Table 4.1 above, the response rates was 89.1%, meaning that it was acceptable and fit for the study.

4.3 Demographic Characteristics of the Respondents

This section presents the demographic profile of the respondents as per their gender, age, KCSE examination score, STEM course pursuing, and year of study. This table represents data fro all universities.

Table 4. 2

Demographic Characteristics of the Respondents

Respondent's gender	Frequency	Percent
Male	214	62.6
Female	128	37.4
Total	**342**	**100.0**
Respondent's age		
18–20 years	79	23.1
21–23 years	213	62.3
24–26 years	50	14.6
Total	**342**	**100.0**
KCSE examination grade		
C+	21	6.1
B-	19	5.6
B	76	22.2
B+	76	22.2
A-	121	35.4
A	29	8.5
Total	**342**	**100.0**
STEM Course Pursuing		
Science	143	41.8
Technology	51	14.9
Engineering	79	23.1
Mathematics	69	20.2
Total	**342**	**100.0**
Year of Study		
Year 1	33	9.6
Year 2	51	14.9
Year 3	101	29.5
Year 4	94	27.5
Year 5	63	18.4
Total	**342**	**100.0**

Table 4.2 above illustrates the gender distribution of the respondents. It is observed that most of the respondents were male, accounting for 214 (62.6%) while 128 (37.4%) were female. This is a clear implication that there is a gender imbalance, whereby male students dominate the enrolment in STEM courses. This could be a result of other social factors and policies which might provide or encourage more entrance to universities education among the male students and not females, and hence the low enrolment and completion rates in STEM courses among female students. Some policies could be arising from the weaknesses of strategies used in the admission to the university such as affirmative action where Onsongo (2009) notes that it does not enhance access as well as gender equity in the university in Kenya. However, the fair presence of female respondents (being above a third) means that useful information would be obtained about all gender and their perception of the STEM courses.

The age distribution of the respondents presented in Table 4.2 above indicates that a majority of the respondents (213; 62·3%) were in the age bracket of 21–23 years, while 79 (23.1%) were in the age of 18–20 years. The remaining 50 respondents (14. 6%) are recorded under those 24–26 years. A majority of the respondents are within the ages of 21–23 years; this is an age group that is commonly associated with universities and therefore correlate with the likelihood of being involved in STEM education.

The respondents' grades in the KCSE examination in Table 4.2 above show that 121 (35. 4%) of respondents scored an A- grade, while 76 (22. 2%) secured a B and B+ grade respectively. Together, these three grades (B, B+, and A-) account for nearly 80% of the total sample, indicating that the majority of students in this cohort performed at a relatively high academic level. The grades at the extremes of the scale, B- and C+ are less common. Only 19 students scored B- and 21 students (6.1%) received a C+. The relatively low frequency of B- and C+ grades suggests that few students performed at the minimum level typically considered for university entry. This high academic performance makes it possible for any beginner in STEM courses to be regarded a high achiever in secondary education, and this may affect their confidence and persistence in these difficult fields (Ozkan & Kettler, 2022).

Table 4.2 above also shows the breakdown of respondents according to the STEM courses they are taking. The most frequent specialization is in Science with 143 students (41.8%) while engineering had fewer students taking the course with only 79 students (23.1%) followed by mathematics with 69 students (20.2%). The number of respondents enrolled in

Technology is comparatively smaller, 51 (14.9%) which may suggest that students in this faculty should be encouraged or provided with more support/resources. The data also reveals the interest in science and engineering courses, which are mostly inclined towards male students and may thus augment the gender divide.

Additionally, Table 4.2 above presents the year of study of the respondents, whereby 63 students (18.4%) were in Year 5 which is a low representation compared to year 3 and year 4. This could be due to students graduating or transitioning out of the program after Year 4 or the engineering students who have a 5-year undergraduate program. The majority of the respondents were in their third year with 101 (29.5%) and fourth years with 94 (27.5%). This distribution implies that the collected sample contains a large number of students who are pretty much into their courses. The lower response rate in Year 1 (33 respondents, 9.6%) and Year 2 (51 respondents, 14.9%) can be explained by the difficulties in attracting students to the STEM courses or their dropout due to the socioeconomic or gender reasons. This initial drop-off could also be due to students reassessing their commitment to the program early on. The distribution of students by the year of study reveals that most students are in Year 3 and 4, while a few are in Year 5. It is evident that distribution pattern has transitioned at the end of Year 4, an indication that a majority of STEM programs in Kenya have a four-year period. This group helped in comprehension of the factors contributing to such trends would prove beneficial in the efforts aimed to improve retention and success rate in the terminal years.

4.4 Descriptive

4.4.1 Decision to Choose the STEM Course

Table 4.3

Decision on Choice of the STEM Course

	Frequency	Percent	Cumulative Percent
I chose	294	86.0	86.0
Not my will	48	14.0	100.0
Total	342	100.0	100.0

From the Table 4.3 above, most of the respondents who completed the course willingly were 294 of the total 342, representing 86.0%. This implies that students who undertake STEM related courses have high interest and motivation. This inclination may be attributed to the awareness of the listed benefits regarding the STEM field, such as higher chances of employment, higher earnings, and adaptability to the current global market. On the other hand, 48 of the respondents (14. 0%) took STEM courses by compulsion, meaning this could have been forced by the society or parents. This external influence may affect their commitment and satisfaction, and thus increase dropout rates. This minority may have experienced some kind of pressure from parents, society, or the lack of choices, or the lack of someone to advise them, to enrol and take a STEM course when their interests were otherwise inclined.

When asked about the factors that affect students' ability to make career decisions and which is likely to affect student career efficacy and course choice, some of the key informants noted:

> *…….Social support, personality, interests, and socialisation.*
>
> **Key informant interview**
>
> *……Students who feel they are good at problem-solving and critical thinking are drawn to STEM programs themselves because besides believing they will excel they also aim for the vast career opportunities in these fields.*
>
> **Key informant interview, registrar**
>
> *….. Families are usually supportive structures; however, at times they pressure the child into studying STEM courses because such courses will make them have a reputation and stability in life without considering their interest in other fields. This may lead to the adjustment of lowered expectations and consequent disappointments.*
>
> **Key informant interview, Dean**

4.4.2 Enrolments to STEM courses

Table 4. 4

Enrolments to STEM Courses

	N	Minimum	Maximum	Mean	Std. Deviation

I had tried changing my course to non-STEM field but did not succeed	342	1.00	5.00	1.7544	1.03228
I felt good to pursue a STEM related course	342	1.00	5.00	4.6316	.61166
I was convinced that I made a good decision to undertake a course in STEM related field	342	1.00	5.00	4.4825	.76468
I was convinced that learning in a STEM field could help me become useful in the society	342	1.00	5.00	4.4883	.83095
I was convinced that a course in a STEM related field was relevant in the world	342	1.00	5.00	4.5614	.75855
I was confident that I could perform well in my studies in a STEM related field	342	1.00	5.00	4.5175	.75697

The findings in Table 4.4 above are fixated with positive feelings towards the pursuit of STEM courses. The respondents also had a positive attitude towards their decision to take STEM (Mean = 4.63). The low standard deviation (0.61166) suggests that most students strongly agreed with this sentiment, showing a high level of interest towards their STEM studies. Another group of student also perceived it would make them useful to society (Mean = 4.49). The low standard deviation (0.61166) suggests that most students strongly agreed with a mean graded of 4.56 were convinced that a course in a STEM related field was relevant in the world. This sentiment shows a high level of satisfaction and positivity toward their STEM studies. The mean score of 4.5175 suggests that students generally feel confident in their ability to perform well in their STEM studies. The standard deviation (0.75697) indicates that most students are consistent in their confidence, with only minor variations. The results are supported by Rittmayer and Beier (2008) the work of that students' belief in their STEM abilities was necessary in influencing their enrolment decisions and persistence.

On the other hand, the overall mean score of 1.75 represented students who tried changing their course to a non-STEM field, but did not succeed, which implies that most of the respondents remained steadfast in the STEM fields despite the challenges they faced in the process. The relatively low standard deviation (1.03228) implies that the responses were somewhat consistent, with most students clustering around disagreement.

The following are some responses from key informants regarding the enrolling of students in STEM programs:

> …… *Students take STEM courses and programs because they deem it an avenue to quality jobs.*
>
> **Key informant interview, registrar**

> …… *Students enrol for STEM courses as they find these fields fascinating.*
>
> **Key informant interview, dean**

4.4.3 Challenges Affecting Course Progress

Table 4. 5

Challenges Affecting Course Progress

	N	Minimum	Maximum	Mean	Std. Deviation
I find it difficult to complete my courses due to the course workload	43	1.00	5.00	2.1163	.98099
I find it difficult to complete my course due to the course difficulty	43	1.00	5.00	2.2326	1.19198
I find it difficult to complete my course due to lack of family support	43	1.00	5.00	2.5116	1.33403
I find it difficult to complete my course due to lack of support systems or resources (available to non-STEM students).	43	1.00	5.00	2.7907	1.38973

I find it difficult to complete my course due to financial constraints	43	1.00	5.00	3.5116	1.63841
I find it difficult to complete my course due to personal commitments	43	1.00	5.00	2.3023	1.35462
I would like to study my current STEM course to completion and beyond	43	3.00	5.00	4.7907	.55883
I am confident that I can perform well in my studies in a STEM related field	43	4.00	5.00	4.8837	.32435

Results in Table 4.5 show the responses by individuals who were behind their colleagues that enrolled with them. It indicates that with a mean of 2.1163 and a standard deviation of 0.9810, a majority of respondents disagreed that the difficulties of the course workload was a course of their delay in completion. Similarly, a majority of respondents disagreed that the difficulty of the STEM course was the reason for their completion delay, as shown by a mean of 2.23326 and a standard deviation of 1.19198. Further results show that a majority of students were neutral on the contribution of lack of family support and resources available to other non-STEM students on their delay in course completion with a mean of 2.5116 (standard deviation of 1.334) and 2.7907 (standard deviation of 1.390) respectively. A good number of students agreed that financial constraints delayed them from completion (mean of 3.5116), but there was variation in responses, as shown by a standard deviation of 1.638. These results are in support of the findings by Winterer et al. (2020) that lack of the necessary financial resources inhibits students to attend higher education institutions for STEM programs.

Many disagreed with personal commitments as a cause for their delay in completion (mean 2.302). These findings are supported by the respondents' response regarding their desire to study their program to completion and beyond (minimum 3, maximum 5, mean 4.791, and standard deviation 0.559) and their confidence that they can perform well in STEM fields (minimum 4, maximum 5, mean 4.88, and standard deviation of 0.324). These findings indicate that the respondents have career awareness on STEM career interests. They believe in their ability to perform well in STEM courses. Consequently, the results are in line with the study of Jiang et al. (2024) who found that career awareness mediated by self-efficacy as well as outcome expectations, which in turn enhanced STEM career interests.

Regarding the completion rates of STEM students, one of the key informants noted that:

> …… *Stem programs are normally challenging, and the students are overwhelmed with loads of work. Hence, students who are not well-equipped to dedicate the required amount of time in learning will struggle passing; hence, the impact on completion figures*.
>
> **Key informant interview, registrar**

4.4.4 Family Support in STEM Programs

Tables 4.6 below shows the importance of family support for STEM education. In this aspect, majority of the respondents feel they have strong family support. Students with a mean of 4.72 stated they received overall family support for education. This indicates strong overall family support for students’ university education. The low standard deviation suggests that this support is consistent across most students, reflecting a common experience of family encouragement. The mean score of 3.6725 suggests moderate agreement that families empathize with the pressures students face. The higher standard deviation indicates a wide range of experiences, with some students feeling more supported emotionally than others. With a mean of 4.6053, financial and logistical support is perceived as strong among most students. This shows that families are actively involved in providing necessary resources to aid their children's education. This statement reflects a slightly lower mean (4.0234), indicating that while most students felt they had sufficient financial support, there was more variability in this experience, as indicated by the higher standard deviation. The mean score of 4.3626 indicates a strong perception that families help students to access educational resources. However, the slightly higher standard deviation suggests some variation in how much support students receive in this area. The mean score (4.2749) suggests that a majority of students generally feel their families are involved in monitoring their academic progress, as supported by a relatively low standard deviation, indicating small variation in how actively families engage. These findings agree with Burt and Johnson (2018) that involvement of parents was an important ingredient in a child’s academic trajectory, including interest in

STEM subjects. They further support the study by Bueno et al. (2022), which established that parental engagement as well as the extended families affected students' interest and persistence in STEM fields.

The mean of 3.7164 shows moderate agreement that family members serve as role models or mentors, but the higher standard deviation indicates a significant variability. Some students might have strong role models within the family, while others may not have or have little effect on their interest in STEM. These results could be linked to the findings by Gladstone and Cimpian (2021), which indicated that the influence of role models on interest in STEM was mixed and influenced by various factors. From the side of the role models, it depended on the students' perception of their competence, attainability of their goals, and similarity to students. On the students' hand, gender, age, ethnicity/race, and identification with STEM were important factors influencing their interest in STEM programs. The results further support the work of Kendall (2019) that having a family member with a STEM qualification determined students' STEM identity. For role models to be influential, Winterer et al. (2020) study established that they must possess some key characteristics that include empathic and encouraging, charismatic, gifted, ambitious, knowledgeable, inspiring, and professional.

Two key informants stated that:

> …… *Among parents who are employed and have career background in STEM or science technology engineering and mathematics. It is common to find children emulating the same fate.*

Key informant interview, registrar

> …… *In many cases, the students from the families with connections in the STEM area end up having more information regarding the programs and the employment opportunities. This assists them in making right decisions in enrolment*.

Key informant interview, dean

Additionally, with a mean of 4.0234, it is observed that a majority of respondents agreed that they received substantial financial support from their parents when enrolling and which helps them progress in their courses. However, there is a notable difference among these responses, as indicated by a standard deviation above 1 (1.2034). These results are supported by the mean response of 3.0263 and standard deviation of 1.45586, which reflect a mixed experience regarding the need for external financial aid, indicating significant differences among students' financial circumstances. Also, the mean score of 3.4386 suggests that many students were not sure about their families' income level, but with a standard deviation of 1.2633, there is a considerable variability in these perceptions. Thus, in a way, it seems that some students have faced some financial hurdles that could have affected their chances of enrolments as well as completion rates. Sithole et al. (2017) states that insufficient funding is one of the challenges facing STEM education. A study by Kumar et al. (2021) established that accessing student financial needs by academically talented STEM students was a major challenge responsible for the low enrolment, retention, and graduation rates.

On the role of family support on STEM courses enrolment, some key informants noted that:

….. It is clear that students who have good parental support will be better able to withstand the STEM academic stress since they know they have a strong support system.

Key informant interview, dean

……. It is imperative to bring STEM into the lives of children and help them pursue it diligently, especially when their families are ready to support them financially and emotionally. Children who were socialized to embrace STEM occupations as careers that will guarantee them long term job prospects are more willing to enrol.

Key informant interview, dean

…… In general, the level of encouragement students get from their parents can be said to be directly proportional to the amount of confidence these students have in tackling complex STEM courses, hence the encouragement to enrol.

Key informant interview, registrar

Table 4.6

Family Support in My STEM Course

	N	Minimum	Maximum	Mean	Std. Deviation
My family is supportive of my pursuit of university education	342	1.00	5.00	4.7164	.61622
I feel that my family empathises with the pressures I face in my education	342	1.00	5.00	3.6725	1.11944
My family members have provided financial or logistical support to help me pursue my education	342	1.00	5.00	4.6053	.76144
My family has helped me access educational resources (e.g. books, tutoring) to support my STEM studies	342	1.00	5.00	4.3626	.92702
I have one or more family members who have served as role models or mentors in my education journey	342	1.00	5.00	3.7164	1.27632
My family encourages me to excel in my education	342	1.00	5.00	4.6520	.68839
I feel my family is actively engaged in my progress of education and monitors my results	342	1.00	5.00	4.2749	.95984
When starting my studies, I had adequate financial support from my family that made it easy to enrol and progress in my course	342	1.00	5.00	4.0234	1.20338

Before I started my studies, I had to seek for financial aid (outside my family) to be able to enrol in my course of study	342	1.00	5.00	3.0263	1.45586
I can best describe my family as a low- income	342	1.00	5.00	3.4386	1.26330

4.4.5 Social Stereotype from the Society

Table 4.7

Social Stereotypes from the Society

	N	Minimum	Maximum	Mean	Std. Deviation
I often encounter persons suggesting to me that certain groups (where am not a member) are more suited to pursue STEM courses	342	1.00	5.00	3.3655	1.34111
Stereotypes about who can succeed in a STEM course have affected my confidence in my education	342	1.00	5.00	2.6901	1.25507
I have experienced stereotype related discouragement from family or peers due to my pursuit of a STEM course	342	1.00	5.00	2.8538	1.37925
I often feel discouraged due to stereotypes about my background or gender	342	1.00	5.00	2.4883	1.25543

I have encountered stereotype-related comments or behaviours due to my pursuit of a STEM course	342	1.00	5.00	3.0234	1.32184
I face negative stereotypes that influence how I am treated or assessed due to my pursuit of a STEM course	342	1.00	5.00	2.7281	1.32172
During my study, I have encountered stereotypes about STEM courses that have made me question my place in STEM courses or have made me consider dropping out	342	1.00	5.00	2.9327	1.32808
I feel there are stereotype-related barriers that affect the type of academic support available to me and how easy it is to access that support	342	1.00	5.00	3.0819	1.23215

Results in Table 4.7 above shows that respondents with a mean score of 3.3655 indicated that they often encountered persons suggesting to them that certain groups are more suited to pursue STEM courses. This shows that students frequently face societal perceptions that certain groups are inherently better suited for STEM fields. This reflects the persistence of biased views in society that can contribute to feelings of exclusion or inadequacy among those who do not belong to these perceived groups. Stereotypes appear to have a moderate impact on students' confidence, with a mean score of 2.6901 on the stereotypes about who can succeed in a STEM course affected the confidence of some students in their education. This suggests that while some students are resilient to such stereotypes, others may experience reduced self-confidence, which could potentially hinder their academic performance. The mean score of 2.8538 respondents stated they had experienced stereotype-related discouragement from family or peers due to their pursuit of a STEM course. This indicates that some students encounter negative feedback from their immediate social circles, which could be discouraging and demotivating. These responses support the study of Starr et al. (2022) who found that parents' beliefs on their children, career aspirations, competence beliefs, and the importance of STEM for them, enhance their motivation beliefs.

Similarly, the mean score of 2.4883 stated they often felt discouraged due to stereotypes about their background or gender, which suggests that stereotypes based on gender or background are a significant source of discouragement for some students, although the lower mean indicates this is less widespread. The results are in line with the findings of Starr et al. (2022) that gender stereotype beliefs about STEM negatively affected young girls' competence beliefs. In other words, parent stereotypes had a negative effect on minority race and girls' STEM identity and career aspirations. Similar findings were established by Denner et al. (2018) that parents' believe that STEM programs were most appropriate for the whites and males negatively affected the beliefs of girls and the people of colours about these courses.

Encounters with stereotype-related comments or behaviours are moderately common, as reflected by the mean score of 3.0234. This implies that a notable number of students face direct or indirect discrimination, which could affect their academic experience and sense of belonging in STEM fields. Students also stated that they had faced negative stereotypes that influenced how they were treated or assessed due to their pursuit of a STEM course, with a representation of a mean score of 2.7281. This shows that some students perceive differential treatment based on stereotypes, which could impact their educational outcomes. Additionally, the mean score of 2.9327 for those who encountered stereotypes about STEM courses during their study made some to consider dropping out due to doubt on their fit in pursuing the course. Finally, with the mean score of 3.0819 respondents felt there were stereotype-related barriers that affected the type of academic support available to them and how easy it was to access that support. This highlights that stereotypes can create barriers to accessing academic resources. It further indicates that for some students, stereotypes not only affect their self-perception, but also their ability to receive the necessary support for their studies. The results are aligned with the study by Winterer et al. (2020) which showed that quality interactions with staff and peers support success of students in STEM fields.

4.4.6 Social Stereotype from Students Themselves

Table 4. 8

Social Stereotype from Students Themselves

	N	Minimum	Maximum	Mean	Std. Deviation
There are certain groups (where am not a member) that are more suited to pursue STEM courses	342	1.00	5.00	3.0088	1.50558
It is hard for me to succeed in a STEM course	342	1.00	5.00	2.2573	1.32355
I believe STEM courses are difficult	342	1.00	5.00	2.7836	1.33527
I regret having pursued a STEM course	342	1.00	5.00	1.9561	1.15936
A STEM course is not suitable to a person of my gender	342	1.00	5.00	1.8480	1.18160
I think am treated or assessed negatively by the society because of my pursuant of a STEM course	342	1.00	5.00	2.1871	1.24672

In Table 4.8 above, a mean score of 3.088 declared that there were certain groups that are more suited to pursue STEM courses, which shows they were not sure. It also suggests that some students internalize societal stereotypes, believing that other groups are inherently better suited for STEM. The response on perception of personal success in STEM had a mean score of 2.2573. This relatively low mean suggests that while some students struggle with self-confidence in STEM, the majority do not view themselves as incapable of succeeding. Those believing that STEM courses are difficult had a mean score of 2.7836, indicating that students generally perceive STEM courses as challenging. This perception aligns with common stereotypes about the rigour of STEM fields and may influence students' attitudes and motivation toward their studies. These results align with the findings of Kendall et al.

(2019) that STEM identity, which include interest, competence, performance as well as recognition were crucial elements that improved enrolment, retention and persistence of students in STEM fields.

The mean score of 1.9561 for those who stated they regret having pursued a STEM course suggests that most students do not regret their choice to study STEM, although a small subset may experience regret, possibly due to the challenges and pressures associated with these fields. Similarly, the low mean score of 1.8480 for those who viewed a STEM course not to be suitable to a person of their gender indicates that most students do not believe gender should be a barrier to pursuing STEM, reflecting a rejection of gender-based stereotypes. These results partly agree with the study of Gladstone and Cimpian (2021) that students' perception of their gender influenced their interest in STEM courses.

Finally, the response of those who think they are treated or assessed negatively by society because of their pursuit of a STEM course had a mean score of 2.1871, which suggests that while some students feel negatively judged by society for their choice, this perception is not widespread. However, the presence of this sentiment among a portion of students underscores the impact of societal stereotypes on how students perceive their treatment in the broader social context. These findings partly corroborate the study by Burt and Johnson (2018) who established that teachers' perception of students' potential is an obstacle that affects their participation in STEM.

4.4.7 Career Self-efficacy

Table 4. 9

Career Self-Efficacy

	N	Minimum	Maximum	Mean	Std. Deviation
I am confident in my ability to serve in a career that is related to a STEM field	342	1.00	5.00	4.7485	.54254
I am confident in my ability to adapt if my initial career plans don't work out as expected	342	1.00	5.00	4.4006	.78123

I feel that my capability would be above board in my future STEM related career	342	1.00	5.00	4.3567	.72346
I believe that I would be competent enough to offer exemplary services in my future career in a STEM related field	342	1.00	5.00	4.5731	.63540
Through my STEM education, I have developed awareness of my personal strengths in relation to employability	342	1.00	5.00	4.3947	.77670
Through my studies, I now have knowledge related to a specific occupation in which I am interested to pursue in future	342	1.00	5.00	4.4561	.70782
I am able to set clear goals for my career	342	1.00	5.00	4.4357	.72671
I am able to solve problems related to my career development	342	2.00	5.00	4.4064	.71537

The Table 4.9 above shows a high level of confidence among students regarding their future careers in STEM. The statement whether they are confident in their ability to serve in a career that is related to a STEM field has the highest mean score of 4.7485, indicating that most students are very confident in their ability to succeed in a STEM-related career. Students also express strong confidence in their adaptability, with a mean score of 4.4006 to show they are confident in their ability to adapt if their initial career plans did not work out as expected. This suggests that they feel prepared to navigate uncertainties in their career paths. Similarly, the mean score of 4.3567 felt that their capability would be above board in their future STEM-related career, which shows that students' belief in their ability to perform at a high level in their chosen fields.

The belief in their competence is further reinforced by the mean score of 4.5731 to show they would be competent enough to offer exemplary services in their future career in a STEM-related field. This suggests a strong self-perception of their professional capabilities. Moreover, students recognize the value of their STEM education in developing employability skills, as indicated by the mean score of 4.3947. Students also express confidence in their career knowledge and goal-setting abilities, with mean scores of 4.4561 and 4.4357, respectively, for the statements that through their studies, they had knowledge related to a specific occupation in which they are interested to pursue in the future and were able to set clear career goals. This reflects their ability to plan and pursue specific career paths. Finally, the mean score of 4.4064 respondents stating they were able to solve problems related to my career development, which suggests that students felt capable of addressing challenges that may arise in their career progression. Therefore, the high mean scores across all items indicate that students possess a strong sense of career self-efficacy, particularly in relation to STEM fields. They are confident in their abilities to succeed, adapt, and achieve their career goals, demonstrating a solid foundation for future professional success.

These results confirm past studies such as Liu et al. (2023) and Ogutu et al. (2017) that found that students with higher career self-efficacy were more confident in making career decisions as well as adaptability. A study by Wang et al. (2023) established that people with higher career decision self-efficacy and career values were well-prepared to make informed career decisions. Such individuals have strong belief in themselves regarding the ability to make the right career choices. Including during uncertain times of a career choice. As noted by Ogutu et al. (2017), these findings also show that the sampled institutions have departments and curriculum that address early career needs of students, thus, giving them adequate knowledge about the world of work.

Some responses from the key informants regarding the contribution of self-efficacy on enrolment are as follows:

> …… *Because of the existence of apparent opportunities to obtain the desired job and shortages of STEM personnel, compared to their counterparts in other professions, students specializing in STEM professions seem to be more certain of their decisions than before*.
>
> **Key informant interview, CoD**
>
> …… *In the last few years students have acquired more professional resources, tools, knowledge and advice through internet platforms and*

career services. Overall, they have said that this makes them more confident in making the right career choices.

Key informant interview, dean

4.5 Correlation Analysis

Table 4. 10

Correlation Analysis

		Enrolment	Family support	Stereotype	Career efficacy
Enrolment	Pearson Correlation	1			
	N	342			
Family support	Pearson Correlation	.605	1		
	Sig. (2-tailed)	.000			
	N	342	342		
Stereotype	Pearson Correlation	-.300	.280	1	
	Sig. (2-tailed)	.076	.036		
	N	342	342	342	
Career efficacy	Pearson Correlation	.590	.610	.130	1
	Sig. (2-tailed)	.028	.000	.010	
	N	342	342	342	342

As noted by Schober et al. (2018), correlation analysis was important in establishing the nature and strength of the association between the study variables. Since the variables' data of this study was collected through Likert scale which assumed linearity and of strength and gives ordinal level data (Subedi, 2016), the Pearson correlation technique best fitted this analysis. Pearson correlation assumes data is normally distributed (Schober et al., 2018). Additionally, Boone and Boone (2012) note that combining the Likert type items gives a composite score to quantitatively measure the respondents' attitudes and the association between the variables is measured using Pearson correlation. The correlation analysis results are shown in Table 4.10 above.

It is seen that family support and enrolment were positive correlated and in a statistically significant manner ($r = 0.605$, $p = 0.000 < 0.5$). These results are in agreement with findings of Niu (2017) that family support had a positive correlation with STEM enrolment and increased with an increase in family's socioeconomic status. The study also supports the results of research of Rozek et al. (2017) which showed that parents' involvement in students' STEM learning had a positive correlation with their course-taking and career interest.

Further findings show that socials stereotype had a negative relationship with enrolment, but it was statistically insignificant, $r = -0.300$, $p = 0.076 > 0.05$. The results support the findings of Musso et al. (2022) that negative gender stereotypes had a negative correlation with female's self-confidence and STEM engagement. Additionally, they agree with the works of McGuire et al. (2020) who found that gender stereotype had a negative correlation with STEM course enrolment.

Career self-efficacy had a positive association of 59% ($r = 0.59$) with enrolment and was significant, $p = 0.028 < 0.05$. These findings further support the works of Halim et al. (2018) who found that students' STEM self-efficacy and interest towards all STEM fields had a positive and significant correlation. However, they found that women had high level of self-efficacy in science, while the men's' associate more with engineering discipline. The results are in support of the study of Blotnicky et al. (2018) who found a positive and strong correlation between students with higher mathematics self-efficacy and knowledge about STEM career requirements and their likelihood of enrolling in a STEM program.

4.6 Completion Rates of Graduates in STEM Oriented Courses in Selected Public Universities in Kenya

Table 4. 11

Course Progress Towards Completion Compared to Others

	Frequency	Percent	Cumulative Percent

At the same level	299	87.4	87.4
A semester (s) behind my colleagues	43	12.6	100.0
Total	342	100.0	

Table 4.11 above reveals that the majority of respondents, 299 (87. 4%) confirmed that they are on the right path with their academic endeavours, that is, they are possibly at the same level as their counterparts. However, 43 respondents (12. 6%) said were behind, which was a sign of probable difficulties in completing the course on time or loss of interest in the STEM program. Such delays could be due to factors such as financial constraints, poor academic performance or lack of social support.

4.7 Theoretical Interpretation of Career Self-Efficacy Using SCCT

The finding that STEM students have high levels of career self-efficacy aligns with the principles of Lent, Brown, and Hackett's (1994) Social Cognitive Career Theory (SCCT). This theory highlights how a person's career behavior is shaped by the interaction of their goals, outcome expectations, and self-efficacy beliefs. As shown by mean scores above 4.5 on several career confidence variables, students in this study demonstrated a strong belief in their ability to succeed in STEM-related jobs. According to SCCT, such self-efficacy beliefs directly influence students' career interests, decisions, and their persistence in challenging fields like STEM.

Furthermore, according to the SCCT, there are four main ways that career self-efficacy is developed: physiological states, social persuasion, vicarious learning (role models), and mastery experiences. The impact of these characteristics is shown in the data from key informant interviews, especially those that discuss the importance of family support and information availability via career services and online resources. Vicarious learning is demonstrated, for example, when students gain career confidence from observing successful STEM workers, which is frequently made possible by institutional career services or familial ties. A similar type of social persuasion is when parents promote and believe in their child's potential, which strengthens the student's own self-belief.

The empirical association between self-efficacy and enrolment is theoretically well-justified by this alignment with SCCT. It also emphasises why students who score better on self-efficacy are more likely to stick with STEM subjects in spite of financial difficulties or societal preconceptions. Furthermore, SCCT's emphasis on dynamic and contextual influences on professional decision-making aligns with the conclusion that students exhibit high adaptation to career setbacks.

Students who have weaker self-efficacy, on the other hand, can be more vulnerable to the detrimental impacts of societal stereotypes or a lack of support networks. SCCT recognises that the expression of interests and objectives may be limited by contextual affordances, such as financial constraints or restricted access to STEM mentors. Therefore, even if the majority of the students in this study exhibit high levels of self-efficacy, individuals at the margins may need specific interventions to boost their confidence and support successful STEM trajectories.

In addition to validating the empirical findings, this theoretical viewpoint offers a framework for intervention design that may be used by policymakers and educational institutions. Enhancing self-efficacy through mentoring, success stories, and family involvement should be the main goal of programs that seek to boost STEM enrolment and perseverance. These results highlight the necessity of an all-encompassing strategy that incorporates environmental, social, and cognitive supports in order to maximise career success for STEM students attending public universities in Kenya.

4.8 Gendered Differences in Enrolment and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

4.8.1 Gender and Enrolment Rates in STEM Programs

Table 4. 12

Gender and Enrolment Rates in STEM Programs

Group Statistics					
	Respondent's gender	N	Mean	Std. Deviation	Std. Error Mean
Enrolment	Male	214	4.0841	.46465	.03176
	Female	128	4.0534	.43769	.03869

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Enrolment	Equal variances assumed	.066	.798	.605	340	.546	.03073	.05081	-.06922	.13068
	Equal variances not assumed			.614	280.050	.540	.03073	.05006	-.06781	.12926

Table 4.12 shows the analysis of how gender affects enrollment in STEM courses. Male students had a mean score of 4.0841 with a standard deviation of 0.46465, while female students had a mean score of 4.0534 with a standard deviation of 0.43769. The Levene's test in Table 4.16 showed a significance (Sig.) value of 0.798, which means the variances are considered equal and the data from the top row can be used for hypothesis testing. The t-statistic was 0.605, and the significance value was 0.546. Because this value is greater than the typical alpha level ($p > .05$), the study fails to reject the null hypothesis (H0). This leads to the conclusion that there is no statistically significant difference between the average enrollment rates of male and female students in STEM courses.

.

The findings corroborate the findings of Declercq et al. (2018), who discovered that STEM programs encouraged both men and women to apply. The authors came to the conclusion that admission procedures, particularly whether or not STEM programs were funded, had an impact on both male and female students' decisions to enrol in them. This study also partially confirms the findings of Sevilla et al. (2023), who discovered that gender differences are lessened when both men and women register in STEM university programs from the vocational tracks. According to Chan et al. (2021), the gender gap decreased for students enrolled in bachelor's degree STEM programs, as seen by the 14.7% and 11.8% enrolment rates for male and female high school graduates, respectively. STEM readiness, prior achievement in STEM and non-STEM topics in high school, and high school features were cited as the reasons for a reduced percentage of the gender differences in STEM enrolment.

However, the study contradicts the findings by Vooren et al. (2022) that female students were less likely to enrol for STEM programs. These findings could be attributed to the results of the study by Pedersen and Nielsen (2024), which showed that females had lower self-efficacy levels than males before joining higher education.

Regarding the trend in the enrolment in STEM courses, some of the key informants noted that:

> …… *More female students are joining STEM courses because the stereotypes are becoming less prevalent*.
>
> **Key informant interview, registrar**
>
> ….. *It has been observed that over the period of time, there has been a rise in the female students' confidence in their career choices, especially with enhancement of female figures in STEM fields*.
>
> **Key informant interview, dean**
>
> …… *The confidence that girl students have has been enhanced highly with the availability of female STEM career professionals who are acting as role models.*
>
> **Key informant interview, dean**
>
> …… *Female students may face societal or familial expectations that make them more cautious in their decision-making process, particularly in*

balancing career ambitions with other responsibilities, which can influence their belief in their career choices.

Key informant interview, CoD

4.8.2 Gender and Completion Rates of STEM Programs

Table 4. 13

Independent Sample T-test Output of Gender and Completion Rates of STEM Programs

Group Statistics

	Respondent's gender	N	Mean	Std. Deviation	Std. Error Mean
Course progress towards completion compared to others	Male	214	1.1355	.34307	.02345
	Female	128	1.1094	.31334	.02770

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Course progress towards	Equal variances assumed	2.027	.155	.704	340	.482	.02614	.03713	-.04689	.09917

completion compared to others	Equal variances not assumed	.720	286.576	.472	.02614	.03629	-.04529	.09757

Table 4.13 above results indicate that the average of male and female STEM students' course progress towards completion was 1.1355 and 1.1094 and their standard deviations were 0.34307 and 0.31334 respectively. Further results in Table 4.17 show that Levene's test Sig. value is 0.155 and higher than the significance level, than α =0.05. Consequently, the first row of equal variance is used, and it is found that the t-statistics is 0.704 with a sig. value of 0.482. Therefore, this study fails to reject the null hypothesis, *H0*, and concludes that the mean of course progress towards completion compared to others for male and female students is not significantly different.

These results confirm the study by Weeden et al. (2020) who noted that whereas men were twice more likely to complete baccalaureate degrees in STEM's Premed and Bio-med fields than women while females were twice more likely to earn baccalaureates in a health field than males, persistence and completion for both genders was low. The study also supports the findings of Pedersen and Nielsen (2024) that ladies had only higher dropout rates than men in some STEM disciplines such as mathematics and physics and not the rest.

These results corroborate the past study by Vooren et al. (2022) who found that female and male students in STEM programs performed equally in graduation terms within 10 years. However, they noticed that within the nominal period or nominal period plus one year, female students were less likely to graduate than male. Further findings showed that females were more likely to drop out of the program than males, which was attributed to their low maths score and less interest in STEM courses when enrolling and over time.

In their study, Shortlidge et al. (2024) found that students receiving STEM Intervention Programs (SIPs) persisted more in STEM than students not getting the support, with female students withdrawing entirely or taking leaves of absence declining more than males. The program offers assistance to increase students' persistence and retention to graduation in terms of academic, social support, advocacy, professional and financial support.

Additionally, the study has similarities with the findings of Delaney and Devereux (2022) that the differences in achievement of girls and boys in STEM programs were negligible as it remains at 4% points gap. Additional results indicated that while the difference was noticeable in engineering, there were smaller gaps in nursing and sciences. The findings are in agreement with the results of research by McGuire et al. (2020) who noted that both girls and boys should be, can, and are usually good at STEM. The study further confirms the findings of Shauman (2018) who established that 16% of females and 20% of male students who enrol in STEM majors drop out of college.

On trends in gender and STEM completion rates, some of the key informants stated that:

> *….. There is a growing trend among female students to nurture aspirations toward a STEM career and be adequately confident in those career choices, especially as a result of institutional support programs for women in STEM*.
>
> **Key informant interview, registrar**
>
> *….. Both men and women STEM students have access to similar resources in the course of their learning and career*.
>
> **Key informant interview, registrar**
>
> *….. The confidence that girl students have has been enhanced highly with the availability of female STEM career professionals who are acting as role models*.
>
> **Key informant interview, dean**

4.8.3 Gender and Challenges to Completion

Table 4. 14

Independent sample T-test Output of Gender and Completion Rates of STEM Programs

Group Statistics					
	Respondent's gender	N	Mean	Std. Deviation	Std. Error Mean
Challenges	Male	24	3.2083	.54132	.11050

affecting STEM course progression	Female	19	3.0592	.53743	.12330

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Challenges affecting STEM course progression	Equal variances assumed	.006	.937	.900	41	.373	.14912	.16571	-.18553	.48377
	Equal variances not assumed			.901	38.891	.373	.14912	.16556	-.18579	.48404

Table 4.14 above presents the results of an independent t-test on the challenges affecting STEM students' progress toward completion. Male students had a mean score of 3.2083 with a standard deviation of 0.54132, while female students had a mean of 3.0592 with a standard deviation of 0.53743. The Levene's test in Table 4.18 showed a significance (Sig.) value of 0.937, indicating that the variances are equal. Therefore, the data from the top row was used for further analysis. The t-statistic was 0.900, with a significance value of 0.373. Because this value is greater than the alpha level (α=0.05), the study fails to reject the null hypothesis (H0). This means there is no statistically significant difference in the challenges faced by male and female students in their progress toward completing their STEM courses

These findings are supported by key informants' responses, such as:

> *…….. Some STEM learners have been attributing and blaming their poor performance in these fields to the course difficulties and hardness as well as its nature, which is extremely demanding*.
>
> **Key Informant Interview, HoD**
>
> *…….. We have noticed that financial barriers and balancing the academics with personal commitments have contributed to some students lagging behind the scheduled completion timetables*.
>
> **Key Informant Interview, Registrar**

4.9 Regression Analysis

4.9.1 Family Support and Enrolment Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

Table 4. 15

Regression Results Family Support and Enrolment Rates of Students in STEM Oriented Courses

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.650[a]	.401	.010	.45404

a. Predictors: (Constant), Family support

b. Dependent Variable: Enrolment

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.538	1	8.538	41.446	.000[b]
	Residual	70.093	340	.206		
	Total	78.631	341			

a. Dependent Variable: Enrolment

b. Predictors: (Constant), Family support

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.832	.201		19.023	.000
	Family support	.590	.049	.065	1.203	.000

a. Dependent Variable: Enrolment

The research intended to determine how family support influences a student's decision to enroll in STEM courses. As shown by the R-squared value of 0.401 in the model summary (Table 4.15), family support explains approximately 40% of the variation in student enrollment in these programs. The ANOVA results further confirmed the model's strength. With an F-statistic of 41.446 and a p-value of .000 (which is less than the 0.05 significance level), the findings established that the model could predict the relationship between family support and enrollment in a statistically significant way. The coefficient results provided more specific insights, revealing a β value of 0.590. This indicates that for every one-unit increase in a student's perceived family support, there was a corresponding 0.590-unit increase in their STEM course enrollment rate. The analysis also showed that this relationship was statistically significant, with a significance value of 0.000, which is well below the 0.05 threshold. As a result, the null hypothesis was rejected, and it was concluded that family support had a statistically significant impact on the enrollment rates of students pursuing STEM-oriented courses at the selected public universities in Kenya.

The results of the analysis showed a statistically significant relationship (sig. = 0.000 < 0.05). Consequently, the null hypothesis was rejected, and it was concluded that family support has a statistically significant effect on the enrollment rates of students in STEM-oriented courses at the selected public universities in Kenya. These findings are consistent with a study by Siregar and Rosli (2020), which found that family background influenced interest in STEM, with males showing more interest than females. Similarly, a study by Abe et al. (2021) found that a student's upbringing environment influenced their decision-making self-efficacy and career outcome expectations, which in turn affects their enrollment decisions in STEM programs.

These findings are also consistent with a study by Lloyd et al. (2018), which found that parental involvement and aspirations for their children to attend universities and pursue STEM courses increased student interest. However, even with a supportive environment from parents, boys showed more interest than girls. The study's results also align with Muenks et al. (2020), who found that parents who believed their children could be influenced were more likely to encourage them to pursue a STEM career. Additionally, this study agrees with the research of Šimunović and Babarović (2020), which established that a child's perception of their parents' values and behaviors in STEM influenced the child's own value for these subjects. This, in turn, helps explain their decision to enroll in STEM courses in higher education. Finally, these findings are supported by Dotterer's (2022) research, which found that parental involvement in STEM helped students feel more confident in their abilities. Dotterer also noted that parental participation in STEM was a predictor of adolescents' success in these courses, and this influence could continue into their later years of education.

The results of this study are consistent with past research by Wang et al. (2023), who found that social support, including from parents, was a crucial environmental factor influencing both male and female interest in STEM careers and subsequent college enrollment. Their study also showed that male students' interest in STEM careers was significantly higher than that of females. Additionally, these findings align with a study by Zucker et al. (2021), which discovered that parents with a STEM career themselves had higher self-efficacy and were more likely to engage in STEM activities with their children. This engagement helps children develop intellectually and improves their learning outcomes. The authors also found a strong link between parental involvement and their children's love for STEM courses, as well as their academic performance from preschool through higher education. Zucker et al. (2021) argue, based on expectancy-value theory, that parental support for their children in STEM is rooted in how much they believe their children will succeed in these fields and how well they feel they can guide them.

The findings agree with Lee et al. (2020) that parents’ perception of the value of STEM inspired their sons’ career aspirations, which could explain their increased desire to enrol in colleges. However, results showed that girls’ aspiration for STEM-related career was below that of boys. These findings by Lee et al. (2020) are supported by Tandrayen-Ragoobur and

Gokulsing (2022) who found that females had a low probability of enrolling in a STEM field than males when all other factors are held constant, but were more likely to select STEM degrees than boys when supported by their families.

This study is also in agreement with findings by Svoboda et al. (2016) that the parents' education background had an effect on their children's enrolment in mathematics and sciences in high school and colleges. This relationship was established to be meditated by future identification and motivational beliefs of students and parents about mathematics and science. The results support the findings of study by Thomas et al. (2020) that involvement of parents, especially those with knowledge on community and school resources, STEM career, and college pathways improve their children's attitude and encourage them to look for extra opportunities and future career pursuit.

The findings also coincide with the study by Legewie and DiPrete (2014) who found that students who had family members working in STEM fields or those who were provided with STEM-related resources had a higher likelihood of pursuing similar fields. The authors also established that students from families with higher socio-economic status, who offer both emotional and financial support, tend to have higher enrolment and completion rates in STEM fields. However, it contradicts the study by Weeden et al. (2020), which found that family-work orientation had a weak explanation of the differences in gender persistence and completion in STEM courses.

Some interview responses on the role of family support on STEM students' enrolment are as follows:

> ……. *Children who grow up hearing about the long-term benefits of STEM occupations tend to be more comfortable enrolling in STEM, especially where families are prepared to offer both financial and emotional support.*
>
> **Key informant interview, dean**
>
> …… *The encouragement level that parents and family members accord their children encourage them to enrol in STEM programs, as there is a very high correlation with how they manoeuvre the challenging courses*.

Key informant interview, registrar

….. Family support and assistance is essential for their children's desire to enrol in STEM programs, persist and complete their studies despite the rigorous coursework involved.

Key informant interview, CoD

….. Students from families with professional connections in STEM fields tend to be more knowledgeable about program requirements and career options. This helps them make better informed registration choices.

Key informant interview, registrar

4.9.2 Social Stereotype and Enrolment Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

Table 4. 16

Regression Results of Social Stereotype and Enrolment Rates of Students in STEM Oriented Courses

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.303[a]	.160	-.030	.45501

a. Predictors: (Constant), Stereotype

b. Dependent Variable: Enrolment

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.484	1	2.484	12.003	.000[b]
	Residual	70.391	340	.207		
	Total	72.875	341			

a. Dependent Variable: Enrolment

b. Predictors: (Constant), Stereotype

Coefficients[a]

Model		Unstandardised Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.077	.086		47.243	.000
	Stereotype	-.020	.032	-.003	-.055	.000

a. Dependent Variable: Enrolment

The model summary results in Table 4.16 show an R-squared value of 0.160. This indicates that social stereotypes account for only 16% of the observed variability in student enrollment in STEM programs, with the remaining 84% being attributed to other factors not included in the model. The ANOVA results confirmed the model's good fit, as the F-statistic of 12.003 was statistically significant, with a p-value of 0.000 ($p < 0.05$). The coefficient results provided more specific insights, showing a beta (β) value of -0.020. This means that a one-unit increase in social stereotypes was associated with a 0.020-unit decrease in STEM program enrollment. This effect was also statistically significant, with a p-value of 0.000 ($p < 0.05$). Therefore, the study rejects the null hypothesis and concludes that social stereotypes have a statistically significant effect on the enrollment of students in STEM-oriented courses at the selected public universities in Kenya.

The study confirms the research findings of Vooren et al. (2022) that stereotype was linked to less interest in girls' interest to enrol for STEM programs and subsequent interest to persist. The study supports the research by Luo et al. (2021) that students' stereotypical beliefs about STEM careers had a negative effect on their career-related outcome expectations, which barred them from enrolment in STEM fields.

The results of this study are also supported by the findings of Wang and Degol (2017), who found that social stereotypes in fields like STEM can discourage college students, particularly due to gender stereotypes. The findings align with previous research by Eccles (2009) and Cheryan et al. (2017), which highlight the impact of social stereotypes on students' decisions to enroll in STEM. These studies found that stereotypes portraying STEM as a male-dominated culture can hinder women from enrolling in these courses.

These results confirm the study by Wang and Degol (2017) who found that stereotypes about who belongs in STEM fields such as the belief that men are more suited for technical fields than women deter women and minorities from pursuing these fields. These stereotypes not only affect enrolment but also completion rates, as they can undermine students' confidence and sense of belonging in STEM disciplines. In Kenya, gender stereotypes are deeply entrenched, and women are often discouraged from pursuing STEM careers due to societal beliefs that these fields are better suited for men (Amunga & Amadalo, 2021).

The negative impact of stereotypes on enrolment can be attributed to persistent cultural norms that associate STEM fields with masculinity (Makarova et al., 2019). In Kenya, these stereotypes are reinforced by media, educational institutions, and even family members. As a result, students who internalize these stereotypes may feel less capable or interested in pursuing STEM fields. This discouragement may explain why social stereotypes have a significant, albeit negative, influence on enrolment. Indeed, these arguments were confirmed by the study of Makarova et al. (2019) who found that gender stereotypes of sciences and maths influenced young men’s and women’s inspirations to enrol in STEM majors at colleges. Females attributed all STEM subjects to masculinity, but with less pronounced masculine image, they were likely to raise their interests in STEM career.

The interview responses on the effect of stereotypes on STEM enrolment include the following:

> *….. In male-dominated fields such as technology or engineering, female students may feel pressured to think twice about their careers, thus undermine confidence in their ability to make enrolment decisions*.
>
> **Key informant interview, dean**
>
> *….. The prevalent view of STEM careers, especially in computing, mathematics and engineering, as too difficult or ‘masculine’ makes some female students reluctant to pursue STEM subjects*.

Key informant interview, dean

4.9.3 Career Self-efficacy and Enrolment Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

Table 4. 17

Regression Results of Career Self-Efficacy and Enrolment Rates of Students in STEM Oriented Courses

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.590[a]	.230	.003	.45423

a. Predictors: (Constant), Career self-efficacy

b. Dependent Variable: Enrolment

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.382	1	4.382	21.170	.000[b]
	Residual	70.150	340	.206		
	Total	74.532	341			

a. Dependent Variable: Enrolment

b. Predictors: (Constant), Career self-efficacy

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.852	.205		18.762	.000
	Career self-efficacy	.490	.046	.059	1.082	.000

a. Dependent Variable: Enrolment

Table 4.17 above shows that the model summary results have R-Square of 0.230, implying that career self-efficacy accounted for 23% of changes in enrolment in STEM programs. The ANOVA results show that F-statistic is 21.170 and Sig. value = 0.000 < 0.05, meaning the model was fit for career self-efficacy to predict enrolment rates in STEM courses. Additional results show that the career self-efficacy had a beta coefficient of 0.490. This means that increasing career self-efficacy by one unit led to 0.49 units increase in enrolment rates in STEM programs. Since the sig. = 0.000 < 0.05, it follows that the effect of career self-efficacy on STEM enrolment is statistically significant. Therefore, the study rejects the null hypothesis, and it is concluded that career self-efficacy has a significant effect on enrolment rates of students in STEM oriented courses in selected public universities in Kenya.

These results confirm the study by Jiang et al. (2024) that self-efficacy affected STEM career aspirations and enrolment. Further findings were that male and female students differed in their STEM career interests and subsequently enrolment. This study supports the past research by Wang et al. (2023) who found that STEM self-efficacy as well as the STEM career perception influenced students' enrolment in college and affected both male and female students. A study by Delaney and Devereux (2022) established that the low enrolment to STEM programs by females than men could be explained by the fact that the former have lower attachment to STEM after graduation. These results also confirm the research findings of Koch et al. (2022) that self-perception, STEM ability and achievement, and investment as well as ability in non-STEM domains affected completion rates and accounted for the noted gender differences where men had higher rates than women.

The findings are additionally corroborated by the study of Tandrayen-Ragoobur and Gokulsing (2022) who found that self-efficacy was a great determinant of students' choice of STEM degrees. The study is in agreement with the findings of a study by Luo et al. (2021) who found that the self-efficacy of students in STEM activities influenced their STEM career interest and desire to enrol for STEM programs.

The findings are corroborative of the study by Sakellariou and Fang (2021) which found that girls desire to enrol in STEM courses was driven by their confidence in maths abilities while for the men, they were driven by the interest in STEM fields. Such a strong linkage supports the work done by García et al. (2019), who also found that self-efficacy beliefs are directly proportional to enrolment and persistence in STEM fields.

The study is in agreement with the past findings by Svoboda et al. (2016) that future identification and motivational beliefs of students about mathematics and science influenced their decisions to join STEM programs. Indeed, a study by established that students' mathematics self-efficacy influenced their interest in STEM careers in a statistically significant manner, thus informing their decision to enrol.

The results also match those of Chemers et al. (2011), who established that self-efficacy has an enormous impact on students' dynamics and their progression in the courses and fields of their choice in the domain of STEM. These findings imply that as much as eliminating stereotypes is crucial, more attention should be paid to enhancing career self-efficacy to increase STEM course enrolments in Kenyan public universities.

Some key respondents gave the following comments on the effect of career self-efficacy on STEM enrolment rates:

> *….. With clearer career prospects and a higher demand for STEM professionals, students studying STEM careers seem more confident in their choices than before*.
> **Key informant interview, dean**

4.10 Contextualizing STEM Enrolment Trends in Local and Global Perspective

The results of this study should be understood in light of both the national educational environment and international trends in STEM involvement, especially those showing moderate but rising enrolment rates in STEM programs among Kenyan students. The research's findings regarding gendered patterns, financial obstacles, and stereotype-related difficulties reflect larger systemic dynamics that affect STEM pathways globally.

4.10.1 Kenyan National Trends and Policy Initiatives

The advancement of STEM education has been specifically emphasised by government-led programs in Kenya as a crucial tactic for fulfilling the Vision 2030 roadmap and promoting industrial transformation. Organisations like the Kenya National Examinations Council (KNEC) and the Ministry of Education have launched a number of initiatives to broaden access to STEM, such as the creation of specialised STEM schools and scholarships aimed at top-achieving maths and science students. The enrolment of STEM courses at the post-secondary level is still unequal, though, especially for female students and students from under-represented groups, in spite of these initiatives.

In line with national data from the Commission for University Education (CUE), which shows that women are still under-represented in engineering and ICT fields but more equally represented in health and biological sciences, the current findings show a gender imbalance in STEM enrolment (62.6% male vs. 37.4% female). Furthermore, obstacles such a lack of career counselling, cultural preconceptions, and expensive tuition still prevent more students from participating in STEM, especially at rural campuses or among students from low-income families.

4.10.2 Comparative Global Trends in STEM Education

Globally, many countries are facing similar struggles in attracting and retaining diverse populations in STEM fields. For example, UNESCO (2021) reports that women make up only 35% of STEM students in higher education globally, a figure that drops below 30% in engineering and ICT. In Sub-Saharan Africa, the representation of women in STEM-related academic programs is even lower, with countries such as Nigeria, Uganda, and Ethiopia also reporting wide gender gaps in STEM participation. These figures provide important comparative benchmarks for interpreting the Kenyan context and suggest that the under-representation of women in STEM is part of a larger global pattern shaped by structural inequalities and socio-cultural expectations.

Despite a little improvement, Kenya's numbers still fall short of international standards. The World Bank's East and Southern Africa Higher Education Centres of Excellence Project (ACE II) and the African Union's Agenda 2063 are two initiatives that have aimed to increase STEM capabilities throughout the continent. Kenya benefits from these programs, but systemic problems including gender bias, inadequate science preparation, and underfunding in public universities prevent these goals from being fully realised.

4.10.3 Emerging Best Practices from International Models

Kenya can learn from some of the world's most successful STEM expansion initiatives. For example, Germany's dual-education system and the U.S.-based "STEM for All" effort combine academic and vocational courses, guaranteeing that students not only acquire theoretical knowledge but also experience real-world applications. Similar to this, early STEM exposure, strong career counselling programs, and the inclusion of female role models have all been linked to reducing gender gaps and enhancing retention in nations like Finland and Singapore.

These findings imply that a more comprehensive strategy involving legislative reform, institutional accountability, cultural change, and early intervention is required if Kenya is to increase STEM enrolment and completion rates, particularly among under-represented groups. The study's findings emphasise the necessity of these reforms and point to particular areas that national and institutional strategies should focus on, like career self-efficacy and family support.

4.11 Logistics Regression

The effect of the explanatory variables on the completion rate of STEM was analysed through the binary logistics model.

4.11.1 Family support and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

The model summary results are useful in indicating the proportion of the dependent variable that was explained by the predictor variable. From Table 4.18 below results, family support explained 36% of variability in the completion rate of STEM students as indicated by Nagelkerke R Square's value of 0.360. Hosmer and Lemeshow test as shown in Table 4.18 below was important in showing the goodness of fit of the model. Results show that $\chi 2$ (8) = 20.703 and Sig. value = 0.080 > 0.05, meaning that the observed and predicted values have no significant difference, an implication that the logistic model fitted the data adequately.

Table 4. 18

Logistic Regression Results of Family Support and Completion Rates of Students in STEM Oriented Courses

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	252.128[a]	.190	.360

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than 0.001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	20.703	8	.080

Classification Table[a]

	Observed		Predicted		
			Course progress towards completion compared to others		Percentage Correct
			At the same level	A semester (s) behind my colleagues	
Step 1	Course progress towards completion compared to others	At the same level	299	0	100.0
		A semester (s) behind my colleagues	43	0	.0
	Overall Percentage				87.4

a. The cut value is 0.500

Table 4. 19

Logistic Regression Results of Family Support and Completion Rates of Students in STEM Oriented Courses Variables in Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1[a]	Family support	-.805	.311	6.688	1	.010	.447	.243	.823
	Constant	1.260	1.225	1.057	1	.304	3.524		

a. Variable(s) entered on step 1: Family support.

The model is for prediction of a semester behind my colleagues. Results show that the model correctly predicted that 299 of STEM students at the same level as their colleagues, were indeed continuing their studies at that level. It also correctly predicted zero cases of students being at any semester behind their colleagues, should actually have been at the same level. Consequently, the model was 100% in prediction. Further results indicate that the model incorrectly predicted that none of the students should be left behind leading to 0%, and also wrongly predicted that 43 of STEM students who were left behind should have been at the same level as their fellow students whom they were admitted together.

Looking at table 4.19 above, results show that an increases in family support was associated with a decrease ($\beta = -0.805$) in the number of STEM students lagging behind their colleagues in the completion progress. The Exp (B) value of 0.447 is the odds ratio and means that for every unit increase in the family support, the odds of lagging behind in the progress towards completion decrease by a factor of 0.447.

The results further corroborate the findings by Gülhan (2023) that the participation of the family in students' learning had a positive effect on their progress in STEM courses. Some of the activities through which parents offer support in the STEM education was through the provision of technology. The findings are also in support of the study of Gutfleisch and Kogan (2022) that parental occupation had an effect on the achievement of STEM students. The findings showed that parents in STEM career influenced males and females differently based on their level of study, where ladies in lower levels were influenced more while male at higher learning levels were more influenced.

The study agrees with the previous research by Bueno et al. (2022) who established that socio-emotional support by parents for low-income college students undertaking STEM courses helped them overcome the feeling of being marginalised and greatly contributed towards their self-efficacy. Familial support assisted students experiencing lower levels of success and at a higher risk of dropping out. The results are also supported by the study of An et al. (2019) who established that parents' emotional involvement in their children's learning affected their STEM academic success. The findings are in support of the study of Haden et al. (2014) who established that parents' understanding of STEM provoked their conversations with students in their learning, which is likely to affect their performance. The results partly agree with the study of Hoferichter and Raufelder (2019) who found that mother support in STEM improved girls' performance in these subjects but adversely affected boys' maths performance over time. Further findings indicated that over time, males did not benefit from their parent's support in biology and mathematics performance.

However, the study by Ing (2014) established that the perceived parental support did not have an effect on the continued success in science for both females and males. They also found that parents' support helped in mathematics achievement growth for male and nor females students. Additional results indicated that science and mathematics achievement trajectories had a positive relationship with STEM career persistence. Also, the study by Sevilla et al. (2023) established that while prior exposure to STEM courses in the academic path boosted enrolment in post-secondary institutions, it did not affect later persistence and completion.

Asked about their views regarding the effect of family support on the rate of completion of students in STEM courses, some key informants stated that:

> *….. Family support is important for children's desire to enrol and their ability to stick with rigorous academic work in STEM programs. We looked at students who stuck with STEM because their family supports them through tough times.*

Key informant interview, registrar

> *…… Students may develop the perception that STEM disciplines are not only accessible, but also more rewarding by having a strong support system in their families. Families can help moderate STEM barriers by envisioning them as stepping stones to success.*

Key informant interview, registrar

4.11.2 Stereotype and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

Table 4. 20

Logistic Regression Results of Social Stereotype and Completion Rates of Students in STEM Oriented Courses

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	257.907[a]	.020	.040

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than 0.001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	3.602	8	.891

Classification Table[a]

	Observed		Predicted		
			Course progress towards completion compared to others		Percentage Correct
			At the same level	A semester (s) behind my colleagues	
Step 1	Course progress towards completion compared to others	At the same level	299	0	100.0
		A semester (s) behind my colleagues	43	0	.0
	Overall Percentage				87.4

a. The cut value is 0.500

Table 4.21

Logistic Regression on Social Stereotype and Completion Rates of Students in STEM Oriented Courses-Variables in Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Stereotype	.189	.218	.753	1	.385	1.507	.540	1.269
	Constant	-1.452	.577	6.339	1	.012	.234		

a. Variable(s) entered on step 1: Stereotype.

The model summary in Table 4.20 above shows a Nagelkerke R Square value of 0.040, implying that social stereotype accounted for only 4% of completion rate of STEM courses. Further results show that Hosmer and Lemeshow test had a $\chi 2$ (8) = 3.602 and Sig. value = 0.891> 0.05, meaning that the observed and predicted values have no significant difference, which further implies that the logistic model fitted the data adequately. Results in Table 4.23 below indicate that the model predicted 299 STEM students would be at the same level, and indeed 299 students were in the course of completing their studies. Additional results show that it correctly predicted that none of the students at the same level should be lagging behind their completion schedule. It follows that the model was 100% accurate in this category prediction.

Further results indicate that the model predicted that none of the STEM students should be behind their colleagues, and in fact zero students were incorrectly predicted. Likewise, it incorrectly predicted that 43 of students who were behind the completion schedule should have been at the same level with other colleagues. Therefore, the model was 0% correct in predicting the students lagging behind in their completion. Overall, the model was 87.4% correct in classifying the cases.

Results in Table 4.21 above indicate that β= 0.189, implying the increased social stereotype was associated with increased cases of being behind the course completion time. It is also observed that Exp (B) is 1.507, meaning that one increase in social stereotype was associated with a rise in the number of students left behind in their STEM course completion. The results are in agreement with Vooren et al. (2022)'s study findings that despite the positive reinforcement given by parents to women STEM students, the authors argue that it decreases with time while the negative effect of enforced stereotype increases, resulting in high dropout rates. In their study, Jouini et al. (2018) found that negative stereotype lowered self-confidence and decisions to achieve. The enforced stereotype lead to gender difference in maths performance for ladies, which results in their under-representation in STEM programs as well as lower performance once enrolled.

The study further supports the study of Cheryan et al. (2017) who established that social stereotypes, especially those portraying STEM fields as male-dominated, can create environments that undermine certain students' academic confidence and performance. This can lead to delays in completion or even dropout from STEM programs. Steele and Aronson (1995) also introduced the concept of stereotype threat, where the fear of conforming to negative stereotypes affects academic performance. This could partly explain why an increase in stereotypes is linked to delays in STEM completion rates. The stress and anxiety stemming from such environments may hinder students' ability to focus on their studies, leading to them falling behind in coursework. In light of these findings, it is crucial to address stereotypes within academic environments. Doing so could mitigate their adverse effects on student performance and improve STEM course completion rates.

Respondents were interviewed on their views regarding the role of stereotypes on STEM completion rates, and some responses were:

> *….. After enrolment, STEM female learners feel they must keep on always proving they belong, which can erode their self-assurance and perseverance. Compared to male colleagues, female students are more likely to drop out because, according to some, they are alone or because teachers or classmates question their abilities.*
>
> **Key informant interview, dean**
>
> *….. The bias that female students are not as productive or productive as their male counterparts underestimates their skills and can discourage them from pursuing internships or careers in STEM*

disciplines. This affects both their graduation and those who move into the workforce.

Key informant interview, CoD

….. Due to the perception that they are not as good or as successful as their male counterparts, female students sometimes underestimate their potential and may seek fewer internships or jobs in STEM fields, this affects their completion and entry into the workforce in.

Key informant interview, CoD

4.11.3 Career Self-efficacy and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

Table 4.22

Logistic Regression Results of career Self-efficacy and Completion Rates of Students in STEM Oriented Courses

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	257.060[a]	.005	.009

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than 0.001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	7.998	7	.333

Classification Table[a]

Observed	Predicted		
	Course progress towards completion compared to others		Percentage Correct
	At the same level	A semester (s) behind my colleagues	

Step 1	Course progress towards completion compared to others	At the same level	299	0	100.0
		A semester (s) behind my colleagues	43	0	.0
	Overall Percentage				87.4

a. The cut value is .500

Table 4.23

Logistic Regression Results of Family Support and Completion Rates of Students in STEM Oriented Courses – Variables in Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Career efficacy	-.433	.360	1.449	1	.229	.542	.762	3.122
	Constant	-3.895	1.647	5.592	1	.018	.020		

a. Variable(s) entered on step 1: Career efficacy.

Results in Table 4.22 above indicate that the model predicted 299 STEM students would be at the same level, and indeed 299 students were in the course of completing their studies. Additional results show that it correctly predicted that none of the students at the same level should be lagging behind their completion schedule. It follows that the model was 100% accurate in this category prediction. Further results indicate that the model predicted that none of the STEM students should be behind their colleagues, and in fact zero students were incorrectly predicted. Likewise, it incorrectly predicted that 43 of students who were behind the completion schedule should have been at the same level with other colleagues. Therefore, the model was 0% correct in predicting the students lagging behind in their completion. Overall, the model was 87.4% correct in classifying the cases.

Results in Table 4.23 above indicate that β= -0.433, implying the increased career self-efficacy was associated with reduced cases of being behind the course completion time. It is also observed that Exp(B) is 0.542, meaning that one increase in career self-efficacy was associated with a drop in the number of students left behind in their STEM course completion.

The study aligns with the works of Han et al. (2021) that showed that students' STEM attitudes that include expectancy-value beliefs and self-efficacy, STEM career awareness, and 21^{st} century skills affected their knowledge and achievement in STEM. The results agree with the study findings of Sakellariou and Fang (2021) that students with higher self-efficacy persisted longer after enrolling and had higher probability of succeeding in STEM disciplines and graduating within the nominal time. The results are also in agreement with the study of Rittmayer and Beier (2008) who established that learners with high self-efficacy were more likely to maintain their interest in STEM and perform better, leading to timely completion of the programs.

This result aligns with established theories and empirical findings of Bandura (1997) whose work on self-efficacy demonstrated that students with higher levels of self-efficacy are more likely to persist in the face of academic challenges. They are more resilient and better equipped to overcome setbacks, which reduces their likelihood of falling behind in their courses. The study also agrees with the study of Zeldin and Pajares (2000) who found that higher career self-efficacy correlates with greater persistence and success in STEM fields, as students with strong self-efficacy beliefs are more likely to approach difficult tasks with confidence and determination, leading to timely completion. This underscores the importance of fostering self-efficacy among STEM students through targeted interventions, such as mentoring programs, workshops aimed at developing problem-solving skills, and providing role models who reinforce positive beliefs about their capabilities in STEM.

The following are some of the key informants' comments regarding the effect of career self-efficacy on STEM completion rates.

> *….. Students tend to finish their levels more speedy once they have unique career dreams and a robust notion in their capabilities to attain them. They are more likely to stay with their STEM stages even though the curriculum gets challenging.*

Key informant interview, CoD

….. One of the most vital factors in career self-efficacy is mentoring. Students who have access to mentors usually have extra self belief in their capacity to excel in STEM fields. Strong support networks prevent college students from dropping out.

Key informant interview, dean

4.12 Thematic Insights from Key Informant Interviews on Course Selection Motivation

Beyond the quantitative findings, qualitative data from key informant interviews provided deeper insights into the decision-making processes that influence students' enrolment into STEM programs. Several themes emerged from the responses of registrars, deans, and heads of departments. These themes shed light on the socio-cultural and psychological underpinnings of students' career choices and reveal complexities not fully captured by numerical data alone.

4.12.1 Intrinsic Motivation and Passion for Problem Solving

One dominant theme was the role of intrinsic motivation—especially an interest in solving real-world problems—as a driver for students choosing STEM fields. According to one registrar:

> "*Students who feel they are good at problem-solving and critical thinking are drawn to STEM programs themselves because besides believing they will excel, they also aim for the vast career opportunities in these fields.*"

This perception aligns with the findings from the descriptive data, where the majority of students (mean = 4.63) indicated strong satisfaction and belief in the relevance and usefulness of their STEM course. The qualitative narrative confirms that many students do not enter STEM by accident; rather, they have a clear sense of purpose shaped by their interests and perceived abilities.

4.12.2 Influence of Parental Aspirations and Societal Expectations

A second theme revolves around **external influences**, particularly the role of family and societal expectations. Several informants noted that students often feel compelled to pursue STEM due to pressure from parents who associate these fields with prestige and financial stability. As one dean observed:

> "*Families are usually supportive structures; however, at times they pressure the child into studying STEM courses because such courses will make them have a reputation and stability in life, without considering their interest in other fields.*"

This reflects the dual nature of support—while parents may intend well, their expectations can sometimes override students' autonomy, potentially leading to lower satisfaction or course misalignment.

4.12.3 Lack of Career Guidance and Information Access

A recurring concern among informants was the **inadequate career guidance systems** in secondary schools, particularly in underserved areas. This absence leaves many students without the tools to make informed decisions. As one CoD mentioned:

> "*Most of these students pick STEM because it's what their teachers or older siblings told them would lead to a good life—but they don't fully understand what the course entails until they are already enrolled.*"

This aligns with literature noting that poor pre-university exposure contributes to high attrition in STEM programs (Winterer et al., 2020). It suggests a critical need for early, targeted career intervention programs that demystify STEM and offer realistic previews of the field.

4.12.4 Role of Institutional Branding and Peer Influence

Another key theme is the **influence of institutional reputation and peer networks**. Students often choose specific universities and courses based on what they hear from peers or see in media portrayals of successful STEM graduates. One registrar stated:

> *"Sometimes, it's peer influence or the name of a university department that attracts students. They come in thinking 'this course will change my life'—often based on what they've seen on social media or heard from friends."*

This insight illustrates the symbolic power of STEM branding, which, while motivational for some, may also create unrealistic expectations if not accompanied by proper preparatory support.

4.12.5 Conclusion of Thematic Analysis

By illuminating the structural, social, and emotional elements influencing students' choices, these qualitative themes enhance the interpretation of the statistical data. Although the data indicates high levels of self-efficacy and contentment, the interviews indicate that these results are frequently influenced by a combination of external demands and internal passion. These results highlight how crucial it is to improve career advice, increase access to STEM-related information, and assist families and students in making well-informed academic decisions.

4.13 Addressing Gaps in Existing Literature

This study fills in a number of significant gaps in the body of knowledge regarding STEM education in Kenya and Sub-Saharan Africa in general. Studies carried out in Western contexts have dominated much of the global conversation surrounding STEM participation, especially when it comes to gender disparity, career self-efficacy, and stereotype threat. These studies frequently overlook the distinct socio-cultural and institutional factors that exist in developing countries. By providing empirical evidence from Kenyan public universities that is supported by both quantitative and qualitative data, the current study helps to close that gap.

4.13.1 Limited Local Evidence on Family Support and Enrolment

Few research have looked at this link in the Kenyan setting, despite the fact that several foreign studies have shown the impact of family support on academic performance in STEM disciplines (e.g., Wang & Degol, 2017; Dotterer, 2022). The ones that do exist frequently concentrate on early childhood or secondary school, which leaves a crucial gap in understanding how family dynamics affect STEM perseverance and enrolling at the university level. In order to fill that gap, this study shows a statistically significant positive correlation between STEM enrolment and course advancement and family support.

Furthermore, this study breaks down "family support" into components like financial support, emotional support, and mentoring impact, in contrast to a large portion of the literature that currently regards it as a single, homogenous construct. This method enables a more sophisticated comprehension of the support components that are most important for fostering student achievement.

4.13.2 Under-explored Role of Career Self-Efficacy in Sub-Saharan Contexts

Although career self-efficacy research has become popular worldwide, not many studies have thoroughly implemented these concepts in African academic institutions. Previous research has mostly focused on American or European student populations (e.g., Liu et al., 2023; Chemers et al., 2011). By evaluating these dimensions in Kenya, this study broadens the geographic scope of investigation and demonstrates that career self-efficacy is a powerful predictor of both enrolment and commitment to finishing a STEM program. By doing this, it offers regional proof to back up and confirm globally created models like the Social Cognitive Career Theory (SCCT).

4.13.3 Gaps in Gender-Based Analysis of STEM Stereotypes

Many studies have not broken down the impacts of stereotype threat by particular stereotype sources, such as internalised views vs. societal attitudes, in developing nations, despite the fact that stereotype threat is a well-established barrier to STEM participation (Cheryan et al., 2017; Makarova et al., 2019). By distinguishing stereotypes from the self (internalised doubt) and from others (external discouragement), and by analysing their different effects on confidence and enrolling patterns, this study offers a novel contribution.

The results indicate that internalised student beliefs—especially those related to gender appropriateness for STEM—are frequently higher predictors of career doubt or regret, whereas external societal prejudices have a moderate impact. This subtle realisation highlights a weakness in stereotype-focused therapies, which typically only address views at the societal level rather than the inner stories of pupils.

4.13.4 Lack of Multivariate Analysis Linking Predictors to Completion Rates

Numerous research on STEM education in Africa concentrate only on enrolment data, frequently failing to connect initial access to perseverance or completion. By employing regression and logistic regression models to examine the relationships between factors including self-efficacy, stereotypes, and family support and not just enrolment but also academic advancement and course completion, this study adds to the body of literature. The discovery that family support considerably lowers the chance of falling behind in course development contributes a substantial aspect to the body of material already in existence, offering useful leverage points for enhancing graduation results.

Overall, by offering localised, multivariate, and psychologically informed assessments of STEM enrolment and persistence, this study closes important gaps in the literature. In addition to confirming certain globally reported patterns, it also brings to light context-specific dynamics that are not well-represented in the literature at the moment. The knowledge gathered can help guide more focused, research-based initiatives meant to raise STEM success rates in Kenya and other comparable settings.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter offers a brief summary of the study findings as per each study objective. It is followed by the conclusions made per every objective. It also presents the implications of the study findings and lastly offers recommendations for future studies.

5.2 Summary of Research Findings

5.2.1 Completion Rates of Graduates in STEM Oriented Courses in Selected Public Universities in Kenya

The first objective of the study was to determine the completion rates of graduates in STEM oriented courses in selected public universities in Kenya and guided by the hypothesis that completion rates of students in STEM oriented courses in selected public universities in Kenya were not high. This objective was answered through descriptive statistics, where the percentage of students at the same level as their colleagues relative to the nominal study period and those who lag behind them was computed. Assuming that no more attrition, it was established that the completion rate was around 87.4%, meaning that students who enrolled for STEM programs, but are currently semester (s) behind are 12.6%.

5.2.2 Gendered Differences in Enrolment and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

The researcher sought to analyse the gendered differences in enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya. The objective was guided by the hypothesis: gender difference has no significant influence on enrolment of students and completion rates in STEM oriented courses in selected public universities in Kenya. The findings indicated that the mean of enrolment in STEM programs by male and female students in the selected public universities in Kenya was not significantly different. Further results have indicated that the mean of course progress towards completion compared to others for male and female students in the selected public universities in Kenya was not significantly different. This could be attributed to the continued reduction in gender stereotypes including at family level that STEM was masculine, affirmative action, self-efficacy where ladies are believing they can do as better as men in these disciplines.

5.2.3 Family Support and Enrolment and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

The third objective was to assess the influence of family support on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya. It was guided by the hypothesis that family support has no significant influence on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya. The study has established that improvement in family support led to an increase in enrolment rates in STEM oriented courses in selected public universities in Kenya with $\beta = 0.590$ and statistically significant, $p = 0.000 < 0.05$. Additionally, results indicated that family support led to a decrease d ($\beta = -0.805$) in the number of STEM students lagging behind their colleagues in the completion progress, implying that it was associated with increased completion rates.

5.2.4 Social Stereotype and Enrolment and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

The fourth objective was to evaluate the influence of social stereotypes on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya and guided by the hypothesis: social stereotype has no significant influence on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya. The study findings have shown that increased social stereotype was linked to a decline in STEM programs enrolment, $\beta = -0.020$, and is statistically significant $p = 0.000 < 0.05$. Further results have indicated that increased social stereotype was associated with increased cases of being behind the course completion time, $\beta = 0.189$.

5.2.5 Career Self-efficacy and Enrolment and Completion Rates of Students in STEM Oriented Courses in Selected Public Universities in Kenya

The fifth objective was to examine the influence of career self-efficacy on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya. It was guided by the hypothesis that: career self-efficacy has no significant influence on enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya. Results have shown that career self-efficacy was associated with an increase in enrolment in STEM oriented programs in selected public universities in Kenya, $\beta = 0.490$, $p = 0.000 < 0.05$. It was also found that career self-efficacy was associated with reduced cases of being behind the course completion time, $\beta = -0.433$. These results indicate that students with high STEM self-efficacy make the right choices and the effort expected to perform better and persist longer.

5.3 Contextualizing STEM Enrolment Trends in Local and Global Perspective

The results of this study should be understood in light of both the national educational environment and international trends in STEM involvement, especially those showing moderate but rising enrolment rates in STEM programs among Kenyan students. The research's findings regarding gendered patterns, financial obstacles, and stereotype-related difficulties reflect larger systemic dynamics that affect STEM pathways globally.

5.3.1 Kenyan National Trends and Policy Initiatives

The advancement of STEM education has been specifically emphasised by government-led programs in Kenya as a crucial tactic for fulfilling the Vision 2030 roadmap and promoting industrial transformation. Organisations like the Kenya National Examinations Council (KNEC) and the Ministry of Education have launched a number of initiatives to broaden access to STEM, such as the creation of specialised STEM schools and scholarships aimed at top-achieving maths and science students. The enrolment of STEM courses at the post-secondary level is still unequal, though, especially for female students and students from under-represented groups, in spite of these initiatives.

In line with national data from the Commission for University Education (CUE), which shows that women are still under-represented in engineering and ICT fields but more equally represented in health and biological sciences, the current findings show a gender imbalance in STEM enrolment (62.6% male vs. 37.4% female). Furthermore, obstacles such a lack of career counselling, cultural preconceptions, and expensive tuition still prevent more students from participating in STEM, especially at rural campuses or among students from low-income families.

5.3.1 Regional Context: Sub-Saharan Africa

Across Sub-Saharan Africa, the demand for STEM professionals has steadily increased due to rapid technological adoption, digital transformation, and the expansion of manufacturing, health, and infrastructure sectors. However, enrolment in STEM programs remains disproportionately low, particularly among women and students from disadvantaged regions.

According to the UNESCO Institute for Statistics (UIS, 2021), STEM enrolment in Sub-Saharan Africa is less than 25% of total higher education enrolment, with women constituting only about 18–22% of STEM students. In Uganda, for instance, a study by Kyoshaba et al. (2020) found that female participation in engineering was below 15%. In Tanzania, STEM enrolment gaps persist due to inadequate secondary school science preparation and rural-urban divides in access to quality education (Makunja, 2022). Similar patterns are seen in Nigeria, where studies have cited sociocultural norms and limited institutional support as key barriers to women's STEM participation (Adamu & Mustapha, 2021).

Compared to these figures, Kenya's STEM completion rate of 87.4% and a female enrolment share of 37.4%—while still below parity—indicate moderate progress, likely due to affirmative action, targeted scholarships, and mentorship programs initiated in the past decade. The Kenyan government has introduced initiatives such as the STEM Education Strategy (2018–2023) and The STEM Enhancement Program supported by the African Development Bank, which have attempted to increase access to science resources and expand teacher training in secondary schools.

5.3.2 Comparative Global Trends in STEM Education

Similar challenges are being faced by several nations worldwide in luring and keeping diverse populations in STEM professions. For instance, according to UNESCO (2021), women only account for 35% of STEM students worldwide, a percentage that falls below 30% in engineering and ICT. Women are considerably less represented in academic programs connected to STEM in Sub-Saharan Africa, where nations like Ethiopia, Uganda, and Nigeria report significant gender disparities in STEM participation. These numbers offer crucial comparison standards for understanding the Kenyan context and imply that the under-representation of women in STEM fields is a component of a broader global trend influenced by sociocultural norms and structural injustices.

Despite a little improvement, Kenya's numbers still fall short of international standards. The World Bank's East and Southern Africa Higher Education Centres of Excellence Project (ACE II) and the African Union's Agenda 2063 are two initiatives that have aimed to increase STEM capabilities throughout the continent. Kenya benefits from these programs, but systemic problems including gender bias, inadequate science preparation, and underfunding in public universities prevent these goals from being fully realised.

5.3.3 Global Benchmarks: Trends and Comparisons

Globally, the push for stronger STEM education systems has intensified in response to the Fourth Industrial Revolution and the transition to knowledge-based economies. Developed nations have been actively working to close gender and access gaps, with varying degrees of success.

In OECD countries, the average proportion of students enrolled in STEM fields at the tertiary level is approximately 27–30%, with females representing around 35% of total STEM students, but with sharp disparities in subfields. For example, women make up nearly 60% in life sciences but only 20% in engineering and computer science (OECD, 2022). Countries such as Germany and South Korea have successfully implemented dual-track vocational-STEM programs, which integrate hands-on technical training with academic learning, thereby improving retention and employability.

Finland and Singapore, two high-performing education systems, have invested in early STEM exposure and curriculum reform, starting as early as primary school. These countries have introduced gender-sensitive pedagogy, female STEM ambassadors, and nationwide science competitions to encourage broad participation.

Relative to these benchmarks, Kenya remains below global averages, particularly in engineering and ICT fields. However, its progress in health sciences and biological sciences is more aligned with global patterns. The Kenyan higher education system's move toward Competency-Based Curricula (CBC) and stronger linkages between academia and industry represent positive steps toward improving STEM outcomes and aligning education with market needs.

5.3.2 Emerging Best Practices from International Models

Kenya can learn from some of the world's most successful STEM expansion initiatives. For example, Germany's dual-education system and the U.S.-based "STEM for All" effort combine academic and vocational courses, guaranteeing that students not only acquire theoretical knowledge but also experience real-world applications. Similar to this, early STEM exposure, strong career counselling programs, and the inclusion of female role models have all been linked to reducing gender gaps and enhancing retention in nations like Finland and Singapore.

These findings imply that a more comprehensive strategy involving legislative reform, institutional accountability, cultural change, and early intervention is required if Kenya is to increase STEM enrolment and completion rates, particularly among under-represented groups. The study's findings emphasise the necessity of these reforms and point to particular areas that national and institutional strategies should focus on, like career self-efficacy and family support.

The common and particular difficulties Kenya confronts in promoting STEM participation become clear when these findings are viewed in a larger local and global context. There are still disparities in student readiness, program completion, and gender equity even while the nation has made significant strides in increasing access to STEM education, especially for young men. Therefore, the knowledge gained from this study adds to the body of information that will guide policy initiatives meant to bring Kenya's STEM education system into compliance with both international standards and national development goals.

5.3.3 Lessons from Regional and Global Models

The international evidence suggests that sustained improvements in STEM participation and completion require:

i. Comprehensive policies that tackle both access and retention;
ii. Inclusive pedagogical practices that challenge stereotypes and foster belonging;
iii. Strengthened career counselling, mentorship, and exposure to role models;
iv. Early STEM education exposure, particularly for girls in underserved communities;
v. Robust institutional data systems to monitor gender parity and track STEM performance outcomes.

Kenya can adapt these strategies by building stronger partnerships with global STEM programs, expanding its mentorship pipeline for under-represented students, and investing in teacher development with a STEM equity focus.

When benchmarked against regional peers and international standards, Kenya’s progress in STEM education is promising but uneven. The study’s findings—particularly around the impact of family support, stereotype resistance, and career self-efficacy—highlight the need for multi-layered, context-sensitive interventions. Kenya stands at a pivotal moment where national momentum can be harnessed to close remaining gender gaps, strengthen completion outcomes, and position the country as a regional leader in inclusive STEM education.

5.4 Limitations of the Study

While this study offers valuable insights into the socio-economic factors influencing gender disparities in STEM enrolment and completion in selected Kenyan public universities, certain limitations should be acknowledged to provide a balanced interpretation of the findings and suggest areas for future inquiry.

5.4.1 Limited Scope and Institutional Representation

The study focused on three of the oldest public universities in Kenya. While these institutions are historically significant and have well-established STEM programs, they may not reflect the full diversity of Kenya's public university system, which now includes over 35 institutions. Newer universities, particularly those in rural or underserved counties, may face different enrolment patterns, resource constraints, or student demographics. As such, the generalizability of the findings across the entire country is somewhat constrained.

5.4.2 Cross-Sectional Design

The study employed a cross-sectional research design, capturing data at a single point in time. While this approach is suitable for identifying relationships between variables, it does not allow for tracking changes or developments over time. As a result, causal inferences cannot be made with certainty—for instance, whether higher self-efficacy directly leads to course completion, or whether it develops as a result of positive academic experiences.

5.4.3 Self-Report Bias

Much of the data was collected through self-administered questionnaires. This introduces the possibility of self-report bias, where respondents may overestimate their confidence levels or under-report negative experiences due to social desirability. Although triangulated with insights from key informant interviews, the absence of objective performance data (e.g., GPA, dropout rates) limits the ability to verify some claims.

5.4.4 Lack of Intersectional Analysis

While gender disparities were a central focus of the study, the analysis did not fully account for intersectional factors such as socio-economic background, rural vs. urban origin, disability status, or ethnic identity. These dimensions may interact with gender and STEM enrolment in complex ways, and their omission may have masked more nuanced patterns of exclusion or support.

5.4.5 Limited Exploration of Institutional Factors

Although some institutional dynamics (such as access to resources and career services) were referenced through key informant interviews, the study did not systematically examine institutional-level factors such as faculty attitudes, curriculum structure, mentorship programs, or learning environments. These factors likely play a significant role in shaping student experiences in STEM, and their exclusion represents a gap in the analysis.

Despite these limitations, the study provides a strong foundation for understanding the key socio-economic and psychological drivers of STEM engagement in Kenyan higher education. Acknowledging these constraints not only clarifies the boundaries of the study's findings but also provides a roadmap for future researchers and policymakers seeking to build on this work.

5.5 Conclusions

This research aimed to evaluate the socio-economic factors that contribute to gender disparities in the enrollment and completion rates of students in STEM-oriented courses at specific public universities in Kenya. To achieve this, the study was guided by five key objectives. The first objective was to determine the general enrollment and completion rates of graduates in STEM programs at the selected universities. The second objective focused specifically on analyzing the gendered differences within those enrollment and completion rates. The third objective assessed how family support influences these rates. The fourth objective evaluated the impact of social stereotypes on student enrollment and completion. Finally, the fifth objective examined the role of career self-efficacy in influencing students' enrollment and completion in STEM-oriented courses.

With regard to objective one, the study concludes that the number of students enrolling in STEM oriented courses in public universities in Kenya and persisting to completion is substantially high. Coincidentally, this number is almost equal to the number of students who reported to have voluntarily enrolled for the STEM courses.

For the second objective, the study concludes that there is no difference in gender enrolment and completion of STEM courses in public universities in Kenya. This is supported by the fact that both male and female students feel they made a good decision to select a STEM course, feel good pursuing a STEM program, are confident about their ability to perform well in their STEM programs, are convinced that the STEM fields are relevant career areas in the world today, and believe that a STEM career would help them achieve life goals.

On the third objective, the study concludes that family supports remains an imperative element in supporting students to enrol in STEM degree programs in universities in Kenya and persist to completion. The family's support of student's pursuit of STEM in the university, provision of financial and other logistical support, assistance by the family in access of educational resources, encouragement and active engagement of family members in the education progress are some of the major ways in which the family encourages STEM students to enrol and complete their programs.

Concerning the fourth objective, social stereotype remains a threat to the advancement of education in STEM programs for both male and female students. Convincing oneself that the STEM courses are difficult, perceiving that the STEM is for a certain group, poor treating by others by virtual of being a STEM student, viewing by others that the STEM courses should be pursued by others and not me, reduced self-confidence when others state that there is a given group and where I do not belong that should excel in STEM programs, and negative comments about the courses from family members and peers have an adverse effect on the enrolment in STEM programs and persistence in Kenyan universities.

Lastly, career self-efficacy is an important factor that influences students' enrolment and completion rates of students in STEM oriented courses in selected public universities in Kenya. Students' assessment of their abilities in science and maths affect their decisions to pursue a STEM career in the future, which prompt them to enrol and persist in STEM programs. The students' confident in their ability to survive in STEM fields, ability to adapt to the STEM career's needs, believe that their capabilities would improve in the future, self-belief of exemplary performance in the STEM field in the future, awareness of personal strengths in STEM fields, STEM career awareness, ability to set clear STEM career goals, and solve problems in STEM career development are important elements affecting students' enrolment in STEM programs and completion.

5.5.1 Broader Implications

The implications of these findings are far-reaching:

i. For Policymakers, the results suggest that gender-targeted STEM interventions are effective, but must now evolve to address finer-grained inequities such as socio-economic status, rural vs. urban backgrounds, and early-career transitions.

ii. For Universities, the need is urgent to institutionalize programs that foster student confidence, mentorship, and career readiness—especially for first-generation or under-represented students in STEM.

iii. For Families and Communities, the research highlights the central role of emotional and logistical support. Families should be viewed not as peripheral actors but as co-educators in the STEM pipeline.

iv. For Researchers, the study opens pathways for deeper investigation into the lived experiences behind the numbers, particularly through qualitative or longitudinal methodologies that track student journeys over time.

Ultimately, this study contributes a locally grounded but globally relevant body of evidence to the broader discourse on STEM education. It highlights that meaningful progress toward gender equity in STEM is possible—when systems, beliefs, and supports align around the shared goal of inclusive academic excellence.

5.6 Recommendations

The study aimed at assessing the socio-economic factors affecting gender discrepancies in students' enrolment and completion in STEM programs in Kenyan public universities. The study also established that there is high level of STEM courses completion. The study results have also shown that there is no significant difference between girls and boys in enrolment and completion of STEM programs. Further findings have indicated that family support and career self-efficacy have significant effect on enrolment and completion of STEM courses in the selected Kenyan public universities. Finally, findings have shown that social stereotype as negative effect on enrolment and completion of STEM courses. From these findings, the study has several implications that include:

5.6.1 Policy and Administrative

The government through the Ministry of Education and Ministry of Gender need to continue developing policies that continuously support equal access to resources by students of all genders, needed to support them in their pursuit of STEM programs. Educationists should ensure that they develop policies that solve teachers' perceptions of women to address the gender stereotype in the education system. Notably, the policies could include promoting justice classroom discourse, developing a growth mind-set, and integrating role models in learning. There should also be efforts to expose and increase students' understanding of career in STEM fields, fortify their self-efficacy and outcome expectations to foster equitable advancement within STEM programs. The government should also develop STEM intervention initiatives for social support, advocacy, professional and financial support of students interested in STEM courses. The parents should also be sensitised on their importance in supporting their children to develop interest in STEM and realise their career goals in these fields.

5.7 Suggested Areas for Future Research

While this study has provided valuable insights into the socio-economic and psychosocial factors influencing gender disparities in enrolment and completion rates of STEM-oriented programs in selected Kenyan public universities, several questions remain unanswered and present fertile ground for future investigation.

5.7.1 Expansion Across More Diverse Institutions

This study focused on three of the oldest and most established public universities in Kenya. Future research should include a broader sample across both newer public universities and private institutions, particularly those located in rural and underserved regions. Such studies could reveal whether institutional resources, geographical location, or governance structures influence STEM enrolment and persistence patterns.

5.7.2 Comparative Studies Between STEM and Non-STEM Disciplines

Future researchers may conduct comparative studies between STEM and non-STEM programs to examine whether the predictors of enrolment and completion—such as family support, career self-efficacy, and social stereotypes—differ across academic domains. Such comparisons could help isolate STEM-specific barriers from broader higher education challenges.

5.7.3 Longitudinal and Mixed-Methods Approaches

This study’s cross-sectional design captures data at a single point in time, limiting conclusions about how student attitudes and experiences evolve. Future research would benefit from longitudinal designs that track students from enrolment through to graduation and into employment. Such studies can better assess causality and provide more robust insights into persistence and attrition in STEM. Combining quantitative and qualitative methods could also reveal the personal narratives and lived experiences that underlie observed statistical trends.

5.7.4 Intersectionality and Equity-Focused Studies

Future research should explore how gender intersects with other identity markers such as socioeconomic status, ethnicity, disability, and rural/urban origin to influence access, performance, and completion in STEM. An intersectional approach would provide a more nuanced understanding of equity challenges in Kenyan higher education and allow for the design of more inclusive interventions.

5.7.5 Institutional Practices and Learning Environments

While this study focused on individual-level factors such as self-efficacy and family support, future research could investigate institutional-level variables—including faculty attitudes, mentorship availability, curriculum design, and campus inclusivity practices. Such studies would be instrumental in identifying best practices for building supportive environments that enhance retention in STEM, particularly for under-represented groups.

5.7.6. Post-Graduation Outcomes and Labour Market Transitions

There is limited local research on the transition from STEM education to the labour market in Kenya. Future studies could explore the employability, career progression, and satisfaction of STEM graduates. Understanding the alignment—or misalignment—between academic training and industry demands can inform curriculum development and career services in universities.

5.7.7 Conclusion

In sum, future research in this field should strive to adopt broader institutional scopes, more diverse methodologies, and intersectional lenses. Such efforts will deepen our understanding of the STEM education pipeline and contribute to the development of more equitable and effective academic and policy interventions across Kenya's higher education sector.

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APPENDICES

Appendix I: Published Paper

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RESEARCH ARTICLE

Social Stereotypes on Enrolment and Completion Rates of Students in STEM-Oriented Courses in Selected Public Universities in Kenya

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ABSTRACT

Science, Technology, Engineering, and Mathematics (STEM) education has a gender disparity. This highlights an injustice issue that exists globally. Girls are prevented from pursuing interests in STEM fields by sociocultural norms that link STEM fields to men. The purpose of this article is to demonstrate how equity can be increased and enrolment and completion rates in STEM-related courses can be improved. The study adopted a mixed methods research design involves the integration of both quantitative and qualitative approaches. The population of the study were students pursuing STEM courses in three selected public universities (University of Nairobi, Jomo Kenyatta University of Agriculture & Technology (JKUAT), and Egerton University). The study included three sampling techniques, namely; purposive, stratified and simple random sampling. Both quantitative and qualitative data was collected and analysed. The results show that male, account for 214 (62.6%) while 128 (37.4%) were female. This is an indication that male students were more, compared to female in STEM courses in the selected universities. The regression results indicate that stereotypes did not significantly predict the outcome variable in the model, as shown by the non-significant p-value ($p = 0.385$) and the confidence interval for the odds ratio including 1.0. While the odds ratio (Exp(B) = 1.507) suggests a potential positive relationship between stereotype-related experiences and the outcome (possibly enrolment, persistence, or academic performance). The findings suggest that while most students do not perceive themselves as inherently unfit or incapable of succeeding in STEM courses, there remains a pervasive awareness of social and demographic stereotypes surrounding STEM participation. This study recommends creation of peer mentoring networks and safe spaces for underrepresented students in STEM where they can share experiences and find encouragement.

Keywords: *Social Stereotypes, Enrolment, Completion Rates & Stem Oriented Courses*

Appendix II: Published Paper

Kabarak Journal of Research & Innovation
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RESEARCH ARTICLE

Career Self-Efficacy on Enrolment and Completion Rates of Students in Stem Oriented Courses in Selected Public Universities in Kenya

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ABSTRACT

Aspirations of students for careers in Science, Technology, Engineering, and Mathematics (STEM) have been found to be positively correlated with their positive impressions of scientists and engineers. In this study, the influence of gender on self-efficacy in STEM field particularly in computer science, health related courses, engineering, agriculture and sciences was examined. The study adopted a mixed methods research design involves the integration of both quantitative and qualitative approaches. The population of the study were students pursuing STEM courses in three selected public universities (University of Nairobi, Jomo Kenyatta University of Agriculture & Technology (JKUAT), and Egerton University). The study included three sampling techniques, namely; purposive, stratified and simple random sampling. Both quantitative and qualitative data was collected and analysed. A simple linear regression analysis shows R value of 0.590, indicating a moderately positive correlation between career self-efficacy an enrolment. The R Square value of 0.230 implies that 23% of the variance in enrolment can be explained by career self-efficacy alone. The findings further revealed that career self-efficacy had a negligible explanatory power in predicting students' course completion status in STEM-oriented programs. The low pseudo-R-square values (Cox and Snell $R^2 = 0.005$; Nagelkerke $R^2 = 0.009$) indicate that career self-efficacy alone accounts for less than 1% of the variance in students' academic progress This study concludes that career self-efficacy plays a significant but limited role in influencing students' decisions to enrol in STEM oriented courses. Career self-efficacy alone does not sufficiently predict course completion; Universities should implement multifaceted support systems. This should include academic advising, psychosocial counselling and learning support services that address the diverse challenges students face throughout their academic journey.

Keywords: *Career, Self-Efficacy, Enrolment, Completion Rates & Stem Oriented Courses*

Appendix III: Questionnaire for Students Pursuing Science, Technology, Engineering and Mathematics Oriented Courses

You are cordially asked to take part in this study, which aims to determine the impact of socioeconomic factors on students' enrolment in STEM (science, technology, engineering, and mathematics) courses at particular public universities in Nakuru, Nairobi and Kiambu County, Kenya. The results of this study will only be used to satisfy requirements for credit. We promise to handle any provided information in the strictest of confidence. Your identity will never be included with your answers in any published results. Please feel free to be as honest as you can. Your cooperation is greatly appreciated.

1 Instructions

1 Kindly refrain from writing your name on the questionnaire.
2 Your provided information will be handled with the utmost discretion.
3 Mark your selection with a checkmark (√).
4 Kindly answer all questions.

5

6 SECTION A: DEMOGRAPHIC DATA

1. What is your gender?

Male ( ) female ( )

2. What is your age?

18-22 years ( ) 23-27 years ( ) 28-32 years ( ) 33 years and above ( )

3. What was your grade in high school?

C+ ( ) B- ( ) B ( ) B+ ( ) A- ( ) A ( )

4. What course are you undertaking?

Medicine ( ) General science ( ) Education science ( ) Engineering ( ) Information science ( ) Architecture ( ) Veterinary medicine ( ) Computer Science ( ) Others specify……………………………….

SECTION B: GENDER AND ENROLMENT OF STUDENTS

This section seeks to facilitate collection of data on enrolment and completion rates of students in STEM oriented courses. Please tick where appropriate (√) using the scale shown below.

SA=Strongly Agree, A= Agree NS = Not Sure, D= disagree SD= Strongly Disagree

Statement	**SA**	**A**	**NS**	**D**	**SD**
I have had adequate access to educational resources (e.g. books, internet access, tutoring) before enrolling in a STEM course.					
I had access to extracurricular activities (e.g science clubs, coding camps) related to STEM that infuenced my decision to enrol in a STEM course.					
I have had adequate access to technology (e.g. computers, software) required for STEM courses which made it easy for me to enrol in STEM courses.					
I have family responsibilities (e.g. caregiving) that made it necessary to enroll into a STEM course.					
I have family responsibilities (e.g. caregiving) that made it difficult to enroll into a STEM course.					
I received support (e.g. financial counselling, academic advising) from previous schools or institutions that encouraged or made it easier to enroll in STEM courses.					
I faced financial challenges that made it difficult for me to enroll in my STEM course.					

7 SECTION C: COMPLETION RATES

This section seeks to facilitate collection of data on completion rates and factors affecting completion rates of students in STEM oriented courses. Please tick where appropriate (√) using the scale shown below.

SA=Strongly Agree (4), A= Agree NS = Not Sure, D= disagree SD= Strongly Disagree

Statement	SA	A	NS	D	SD
I find it difficult to complete my courses due to the course workload.					
I find it difficult to complete my course due to the course difficulty.					
I find it difficult to complete my course due to lack of family support.					
I am aware of specific support systems or resources available to students that make it more likely that I will complete my STEM course.					
I find it difficult to complete my course due to financial constraints.					
I find it difficult to complete my course due to personal commitments.					

SECTION D: ECONOMIC BACKGROUND

This section seeks to facilitate collection of data on economic background in respect of enrolment and completion rates of students in STEM oriented courses. Please tick where appropriate (√) using the scale shown below.

SA=Strongly Agree (4), A= Agree NS = Not Sure, D= disagree SD= Strongly Disagree

Statement	SA	A	NS	D	SD

I had adequate financial support from my family that made it easy to enrol and progress in a STEM course.	
I received scholarships, grants or financial aid that made it easy to enroll and progress in a STEM course.	
I come from an affluent community and this encouraged me to enroll in a STEM course.	
I come from a low-income community and this encouraged me to enroll in a STEM course.	
The potential return on investment in STEM carreers was a major factor on my decision to enroll in a STEM course.	
I have had to find full-time or part time work to be able to afford to enroll and progress in my STEM course.	

SECTION E: FAMILY SUPPORT

This section seeks to facilitate collection of data on a students' belief in their ability to make effective career-related decisions. Please tick where appropriate (√) using the scale shown below.

Statement	SA	A	NS	D	SD
1. My family is supportive of my pursuit of a STEM course.					
2. I feel that my family empathises with the pressures I face in my STEM course.					
3. My family members have provided financial or logistical support to help me pursue my STEM education or career goals.					
4. I feel that my family is well-informed about STEM and provide valuable insights and suggestions.					
5. My family has helped me access educational resources(e.g books, tutoring) to support my STEM studies.					

6. I have one or more family members who have served as role models or mentors in my STEM education journey.
7. My famly has encouraged me to participate in extracurricular activities, clubs or organisations where I can build a network within my STEM field.
8. I feel my family is actively engaged in my progress in my STEM education by for example monitoring results.

8 **SA=Strongly Agree (4), A= Agree NS = Not Sure, D= disagree SD= Strongly Disagree**

9

10

SECTION F: SOCIAL STEREOTYPES ON ENROLMENT OF STUDENTS

7. Are there role models who influenced your career choice?

Yes ( ) No ( )

8. If yes, what role did they play?

11 Decision-making ( ) Opinion shaping ( ) Mind set/attitude ( ) Others specify ………………………………………………………………………………………………… ………………………………………………………………………………………………… …………

9. What is your opinion concerning the following statements on stereotypes of students in STEM oriented courses. Please tick where appropriate (√) using the scale shown below.

SA=Strongly Agree, A= Agree NS = Not Sure, D= disagree SD= Strongly Disagree

Statement	SA	A	NS	D	SD
I am aware of stereotypes that suggests certain groups are more suited to STEM fields than others.					
Stereotypes about who can succeed in STEM have affected my confidence in enrolling in STEM courses.					
I believe STEM courses are difficult.					

I have experienced stereotype related discouragement from family or peers when considering STEM courses.					
I have felt discouraged from enrolling in a STEM course due to stereotypes about my background or gender.					
I have encountered stereotype-related comments or behaviours in my STEM classes.					
I feel stereotypes about STEM have influenced how I am treated or assessed in my STEM courses.					
Stereotypes about STEM courses have made me question my place in STEM courses or have made me consider dropping out.					
I feel there are stereotype-related barriers that affect the type of academic support available and how easy it is to access that support.					

SECTION G: CAREER SELF-EFFICACY ON ENROLMENT OF STUDENTS

This section seeks to facilitate collection of data on a students' belief in their ability to make effective career-related decisions. Please tick where appropriate (√) using the scale shown below.

SA=Strongly Agree (4), A= Agree NS = Not Sure, D= disagree SD= Strongly Disagree

Statement	**SA**	**A**	**NS**	**D**	**SD**
I am capable of finding information about STEM courses.					
I am comfortable when faced with making decisions about my future career path.					
I am capable of identifying my strengths when considering career choices.					
I am capable of identifying my weaknesses when considering career choices.					
I am confident in my ability to set realistic career goals for myself.					

I am confident in my ability to handle setbacks or unexpected challenges in my career journey.
I am confident in my ability to adapt if my initial career plans don't work out as expected.

Are there specific support systems or resources available to students that you believe positively influence completion rates in STEM courses?____

What strategies or initiatives do you think could be implemented to improve completion rates and support students in successfully finishing their STEM courses?____

Appendix IV: Interview Schedule for Deans, Registrars and CODs (Key Informants)

You are cordially asked to take part in this study, which aims to determine the impact of socioeconomic factors on students' enrolment in STEM (science, technology, engineering, and mathematics) courses at particular public universities in Nakuru, Nairobi and Kiambu County, Kenya. The results of this study will only be used to satisfy requirements for credit. We promise to handle any provided information in the strictest of confidence. Your identity will never be included with your answers in any published results. Please feel free to be as honest as you can. Your cooperation is greatly appreciated.

1. Gender: Male ( ) Female ( )
2. What is your position

   Dean ( ) Assistant Registrar ( ) Registrar ( ) COD ( )
3. How long have you been a staff in the Faculty?

   0-1 years ( ) 2-5 years ( ) 6-10 years( ) 11andabove ( )
4. **The Gender Difference in enrollment and completion rates of students in STEM courses.**
   i) What trends have you observed in enrollment of male versus female students in STEM courses?
   ii) What trends have you observed in completion rates of male versus female students in STEM courses?
5. **The influence of family support on enrollment and completion rates in STEM courses**
   i) What is your observation regarding family support provided to male versus female students in STEM courses?
   ii) In your opinion has there been a gender disparity between the amount of support offered to male versus female students in STEM courses?

iii) Has the presence or absence of this support affected the rate of completion of students in STEM courses?

6. **The influence of social stereotypes on enrollment and completion rates of students in STEM courses**

i) Are you aware of any social stereotypes regarding men and women undertaking STEM courses or careers?

ii) How prevalent are these stereotypes regarding men and women undertaking STEM courses and careers and what trends have you observed regarding the prevalence of these stereotypes; are they more or less prevalent now versus the past?

iii) What effects have you observed these stereotypes having on the enrollment of male and female students in STEM courses?

iv) What effects have you observed these stereotypes having on the completion rates of male and female students in STEM courses?

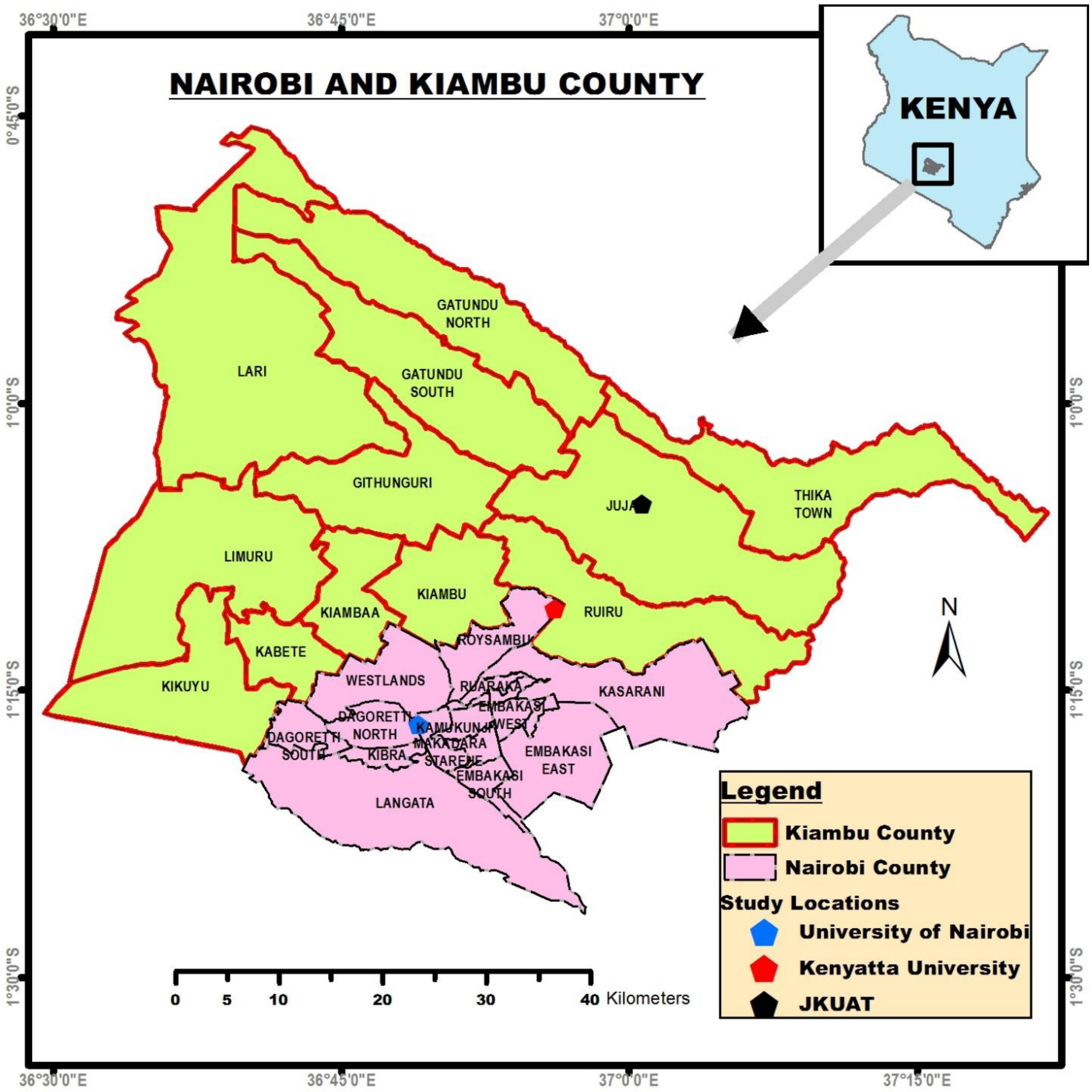
7. **The influence of career self-efficacy on enrolment and completion rates of students in STEM courses**

i) Have you observed any differences between male and female students' belief that they can make correct decisions regarding their careers?

ii) Have there been any trends regarding the students' belief that they can make the correct decisions regarding their careers? Are the students more or less able to make decisions regarding their careers or specialties?

iii) What factors have you observed affecting the students' ability to make carreer decisions and have these factors affected male and female students in STEM differently or similarly?

Appendix V: Map of Study Area



Source. Geography department Egerton University 2018

Appendix VI: NACOSTI Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **370943**

Date of Issue: **03/June/2024**

RESEARCH LICENSE

This is to Certify that Ms.. Susan Wanjiku Njogu of Egerton University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu, Nairobi, Nakuru on the topic: SOCIO-ECONOMIC FACTORS INFLUENCING GENDER DISPARITIES IN ENROLMENT AND COMPLETION RATES OF SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS COURSES IN SELECTED PUBLIC UNIVERSITIES, KENYA for the period ending : 03/June/2025.

License No: **NACOSTI/P/24/36291**

370943

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

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See overleaf for conditions

Appendix VII: Permission to Collect Data

UNIVERSITY OF NAIROBI
OFFICE OF DEPUTY VICE-CHANCELLOR
(RESEARCH, INNOVATION AND ENTERPRISE)

P.O. Box 30197-00100, G.P.O.
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Telephone: 020 491 3164
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Our Ref: UON/CA/RIE/3/5/Vol.XXX

June 11, 2024

Susan Wanjiku Njogu
Egerton University
P.O Box 536 - 20115
Egerton, Njoro
Email: susannjogu66@gmail.com

Dear Ms Njogu

PERMISSION TO COLLECT DATA

I refer to your request to conduct research at the University of Nairobi, for your project entitled: ***"Socioeconomic Factors Influencing Gender Disparities in Enrolment and Completion Rates of Science, Technology, Engineering, and Mathematics Courses in Selected Public Universities, Kenya."***. I write to inform you that your request has been approved.

You are however required to share the findings of your study with the University of Nairobi by depositing a copy of your findings with the Director Library & Information Services on completion of your study.

Yours sincerely,

mjhutchinson
PROF. M. JESANG HUTCHINSON
DEPUTY VICE-CHANCELLOR
(RESEARCH, INNOVATION AND ENTERPRISE)
AND
PROFESSOR OF HORTICULTURE

Copy to: Director, Library and Information Services
Chief Medical Officer, University Health Services

SKB/cg

JOMO KENYATTA UNIVERSITY
OF
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OFFICE OF THE DEPUTY VICE CHANCELLOR
(Research, Production and Extension)

JKU/2/4/033(a) **12th June 2024**

Ms. Susan Njogu
Egerton University
P.O. Box 536
NJORO

Dear Ms. Njogu

RE: PERMISSION TO COLLECT DATA AT JKUAT

This is in reference to your letter dated 11th June 2024 in which you sought permission to collect data for your Ph.D thesis titled **"Socio-Economic Factors Influencing Gender Disparities in Enrolment and Completion Rates Of Science, Technology, Engineering, and Mathematics Courses in Selected Public Universities. Kenya."**. We also note you have attached your Research Licence from the National Commission for Science, Technology and Innovation (NACOSTI).

Approval has been granted for you to collect data on the understanding that all the data collected will be for academic purpose only and will be kept confidential throughout the project and after completion of the project. This is on condition that the University Library will receive a copy of your final thesis for future reference. You must also adhere to the required institutional ethics.

Yours sincerely.

PROF. HELLEN K. MBERIA
AG.DEPUTY VICE CHANCELLOR (RPE)

Copy to: Deputy Vice Chancellor (AA)
Principal, COETEC
Principal, COPAS
University Librarian

JKUAT IS ISO 9001:2015 and 14001: 2015 Certified

Setting Trends in Higher Education, Research, Innovation and Entrepreneurship