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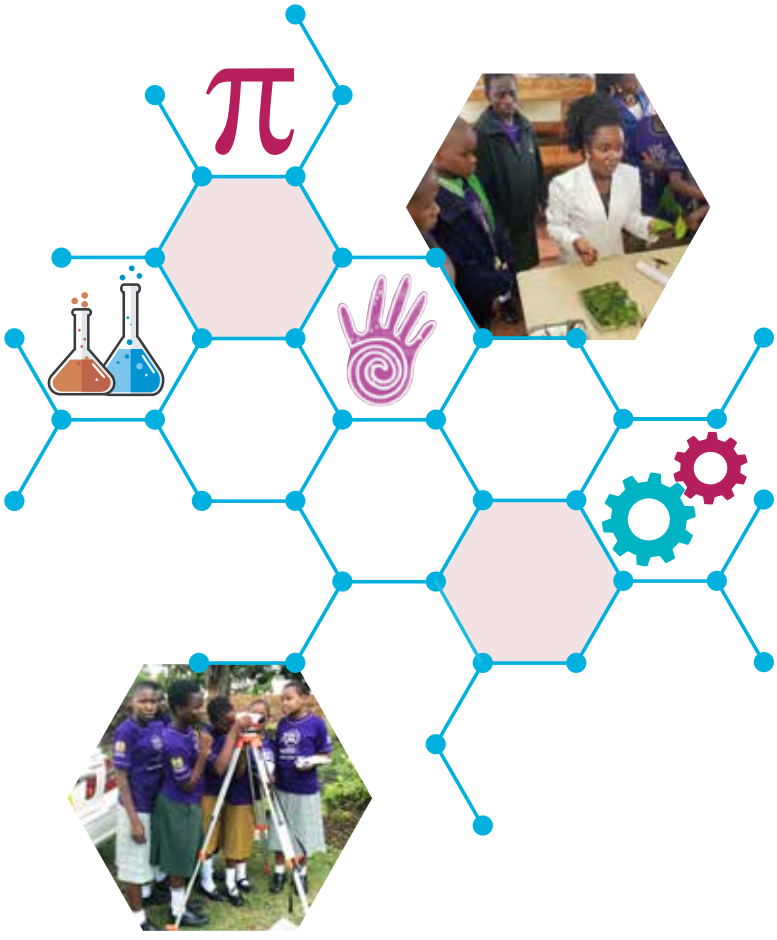
Republic of Kenya

Unlocking the Potential of Girls in STEM in Kenya: An Assessment Report on the Impact of the UNESCO/GoK STEM Mentorship Programme

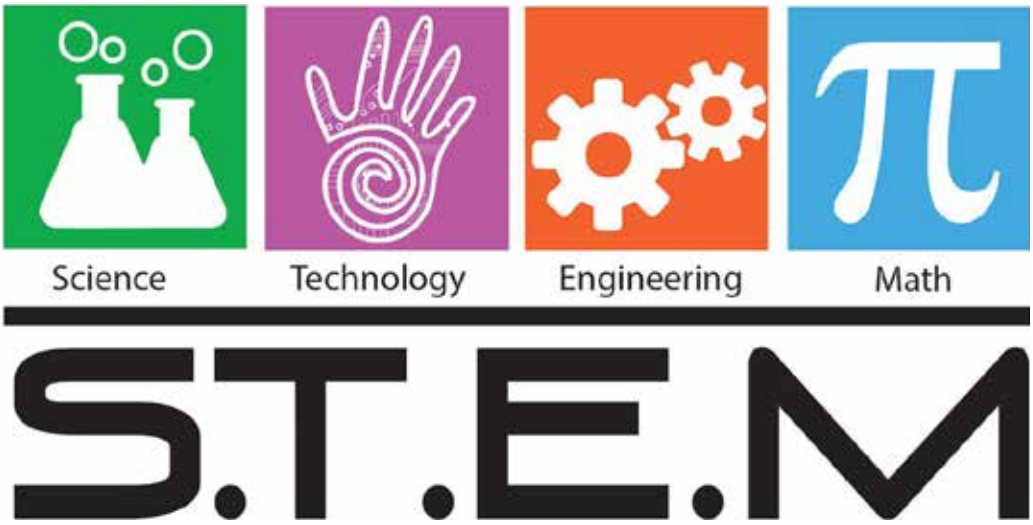


National Commission for
Science, Technology and
Innovation

United Nations
Educational, Scientific and
Cultural Organization

Kenya National
Commission for UNESCO
(KNATCOM)

Unlocking the Potential of Girls in STEM in Kenya: Report of an Assessment to Document the Impact of the UNESCO/GoK STEM Mentorship Programme



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A special mention goes to the STEM Role models who sacrificed their time and energy to mentor the high school girls. Their efforts and contributions are invaluable and greatly appreciated by UNESCO as it endeavours to increase participation of girls and women in the sciences. To all the Universities and Technical colleges that opened their doors together with the different industries and private sector partners that joined hands with UNESCO and the Government of Kenya to provide exposure to students in the learning and work environments, you are all highly appreciated. Your premises and mentorship services that were availed to the visiting students positively changed their perspective towards STEM careers.

Lastly, UNESCO sincerely acknowledges the support of all those who contributed in any way to the success of the UNESCO/GoK STEM Mentorship Programme in Kenya, and to the assessment of its impact on the students who were mentored.

Foreword

This report is the outcome of an assessment of the impact of UNESCO's STEM Mentorship Programme in Kenya. The report provides information to guide the necessary interventions for enhancing Science, Technology, Engineering and Mathematics (commonly referred to as (STEM) Education and the participation of women and girls in STEM subjects and careers. The UNESCO STEM Mentorship Programme was introduced in Kenya in November 2014.

In our STEM education activities, we recognize the importance of partnerships in the realization of the desired impact for our activities. It is for this reason that we rallied our Government partners, namely the Ministry of Education, the Kenya National Commission for UNESCO (KNATCOM), the National Commission for Science, Technology and Innovation (NACOSTI), Universities, and the Private sector to join us in our effort to unlock the potential of girls in STEM.

Our work in STEM education is directed towards addressing the gender gap in STEM by inspiring and nurturing young girls in high school in STEM subjects and ensuring that they see the importance of STEM fields for sustainable development. This report provides information on the geographic spread of the UNESCO STEM Mentorship Programme in Kenya from 2014 to 2019, how it is structured, the number of girls who were mentored during the scientific camps of excellence as well as the schools they came from. It also provides information on how the mentorship camps impacted on the performance of the students in general and particularly on their attitudes towards STEM subjects and careers.

It is important to point out that the report has not taken into consideration the mentorship activities that were conducted for students during the celebrations of the International Day of Women and Girls in Science and the Africa Engineering weeks. Neither has the report considered the programme on STEM Debate Challenge for High school students in the third year of their secondary school studies that was organized in partnership with Interswitch Ltd.

The report underscores UNESCO's strong commitment to addressing the low participation of girls and women in STEM and the organization's willingness to work closely and collaboratively with both Government and Private sector partners to accelerate the pace of change towards realizing gender equality in STEM Education. We believe that it is only by putting all our efforts together that we can usher in a new era of STEM education that is not only gender responsive but more inclusive and ensures that no one is left behind in the contribution towards sustainable development at all levels.

Ann Therese Ndong-Jatta
Director, UNESCO Regional Office for Eastern Africa

Executive Summary

Careers in Science, Technology, Engineering and Mathematics (STEM) are associated with innovation and viewed as jobs for the future. Indeed, STEM fields drive the 2030 Agenda for Sustainable Development, thus enabling innovative solutions to current and future challenges. From the UNESCO report on "Cracking the code: Girls' and Women's Education in STEM", 35% of STEM students in higher education globally are women with variations within specific STEM disciplines. For instance, only 3% of female students in higher education choose information and communication technology (ICT) studies; natural sciences, mathematics and statistics (5%); as well as engineering, manufacturing and construction (8%). Participation is highest in health and welfare (15%) studies. Many barriers have been identified that attempt to explain why few education opportunities exist for girls and at every step there appears to be some systemic challenges that push them out of STEM fields.

UNESCO having recognized this gender gap initiated the STEM Mentorship Programme through Scientific Camps of Excellence in Kenya in 2014, targeting secondary school girls in the country. The overall objective of the STEM Mentorship Programme is to inspire secondary school girls to embrace science subjects with a view to their enhanced participation in STEM courses and careers. This is a one-week intensive mentorship programme whose target has been average performing students and largely those coming from rural areas. In addition, UNESCO identified the need to create awareness among science teachers on gender responsive pedagogy to enable them to sustain the interest in STEM that is created among the students through the mentorship camps. This programme is unique in the sense that it encompasses all the facets of STEM mentorship having three main components namely, mentorship talks by STEM role models, exposure to the learning environment in the higher Education Institutions and partnership with the Private sector which facilitates visits to the industry for students to see the actual application of STEM subjects in providing solutions to real life problems. Coding and robotics were later introduced in the programme which generated a lot of interest among students. At the end of each camp, the students are given some time to demonstrate how STEM knowledge and skills can be used to solve real life societal problems through identification of a problem and conceptualization of a STEM oriented solution.

So far in Kenya, a total of eight regions have been covered namely Nairobi, Coast, Nyanza, South Rift, North Rift, Upper Eastern, Lower Eastern and Western regions. This covers 41 counties and a total of 161 schools with a participation of over 2,000 secondary school girls in the mentorship camps.

The assessment report contains information on the geographic spread of the UNESCO/GoK STEM Mentorship Camps, analysis of the impact and attitude of/feedback from students and teachers who have gone through the programme, views from the education officials, academic institutions and industries that have been part of the programme. To ensure continuity in the advent of COVID-19 pandemic, UNESCO designed a digital STEM Mentorship Programme which was aired by the National Broadcasting Station and thirty eight Community radio stations. The aim was to reach as many students as possible with information on STEM and to ensure that they remain connected to the sciences during the unforeseen school closures. The uptake was overwhelming reaching out to not only girls but also the boys. The programme reached over 12 million listeners throughout the country during the three months of its airing. An online platform, the "UNESCO ASK A STEM MENTOR PLATFORM" was established in partnership

with the national telephone service provider, SAFARICOM, to facilitate continued interaction between the students and the STEM Role models and to facilitate responses by mentors to the students' questions on STEM careers.

Overall, the information emanating from the assessment of the UNESCO/GoK STEM Mentorship Programme since its inception in 2014 will be useful in informing and scaling up of strategies for enhancement of STEM uptake by young people, especially girls. The assessment also presents a picture of how the programme can be improved on with a view to reaching more students throughout the country in a more cost-effective manner. The UNESCO/GoK STEM Mentorship Programme is a unique model for scientific camps of excellence for unlocking the potential of girls in STEM which can be emulated by other countries within the continent.

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Abbreviations and Acronyms

CDE	County Director of Education
GIS	Geographic Information Systems
GoK	Government of Kenya
KNATCOM	Kenya National Commission for UNESCO
MoE	Ministry of Education
NACOSTI	National Commission for Science Technology and Innovation
STEM	Science Technology Engineering and Mathematics

Introduction 1

1.1 Background

According to some studies, 65% of children enrolled in primary school today will have jobs that do not yet exist (World Economic Forum, 2020). Further, although more girls are attending school than before, they are significantly under-represented in STEM subjects and they appear to lose interest in STEM subjects as they reach adolescence. There is need to debunk the myths that girls do not like sciences and other gender stereotypes. These trends can be reversed through investment in mentoring of girls at an early age, gender responsive teacher trainings, gender-responsive pedagogy, and inclusive technology and innovation programmes.

UNESCO having recognized this gap initiated the STEM Mentorship Programme through Scientific Camps of Excellence in Kenya in 2014 targeting secondary school girls in the country. This is a one-week intensive mentorship programme whose target has been average performing students and largely those coming from rural areas. In addition, UNESCO identified the need to create awareness among science teachers on gender responsive pedagogy to enable them to sustain the interest in STEM that is created among the students. This programme is unique in the sense that it encompasses all the facets of STEM mentorship having three main components namely mentorship talks by STEM role models, exposure to the learning environment in the Institutions of Higher Learning and visits to the industry for experience of the actual application of STEM subjects in providing solutions to real life problems. STEM is all about technology and innovation and this saw the incorporation of coding and robotics into the programme to expose students to the fun and beauty of technology. Through this programme, more than 2000 students in over 160 secondary schools have been mentored in different counties across the country. The last mentorship camp was scheduled for April 2020. Unfortunately, this was interrupted by the advent of the COVID-19 pandemic which led to the sudden closure of all learning institutions in the country.

The overall objective of the STEM Mentorship Programme is to inspire secondary school girls to embrace science subjects with a view to their enhanced participation in STEM courses and careers. Specifically, the programme aims to:

i. Inspire and nurture secondary school girls to see science as part of their lives and to embrace STEM fields for their future careers, while dispelling the myth that STEM courses are very difficult and a “no go” zone for women.
ii. Provide the girls with an opportunity to relate and interact with women scientists and engineers for role modelling and mentorship;
iii. Educate secondary school girls on the admission requirements in engineering and science related courses in tertiary level institutions and give them a clear view of the possible STEM professions that are available for them;
iv. Expose the girls to the learning environment at tertiary level institutions and especially for the different fields in Engineering, Applied and Agricultural sciences;

v. Expose the girls to the work environment in the industries to help them relate what they learn in school to the real world of work and their daily lives through demonstrations and hands-on experience;
vi. Expose the students and their science teachers to the beauty, fun and importance of STEM through introduction to Coding and Robotics and the development of Technological applications.

Students learning by doing at Ramogi Institute for Advanced Technology (RIAT) during the exposure to learning Environment visit.
Photo/UNESCO/Ochanda

1.2 Objectives of the Assessment of the UNESCO STEM Mentorship Programme in Kenya

The main objective of the assessment was to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for the advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

Specifically, the assessment was meant to:

1. Produce GIS maps of all the schools that have participated in the programme since its inception and give a clear picture of the total number of secondary school girls touched by the programme, where they are and which STEM courses they are enrolled in if at the University;
2. Determine the impact of the STEM Mentorship Programme on the students' perceptions and attitude towards STEM
3. Determine the impact of the STEM Mentorship Programme on teachers of STEM subjects in schools that participated in the programme
4. Document the views of the education personnel, CDEs, students and teachers and develop a policy brief to assist the lead institutions scale up the programme
5. Document the views of Higher Education Institutions and Industry on the STEM programme and seek ways for stronger engagements to promote the uptake of STEM careers by girls.

Students being shown how solar panels work during a visit to a TVET institution.
Photo/UNESCO/Ochanda

1.3 Rationale for Conducting the Assessment of the UNESCO STEM Mentorship Programme in Kenya

Since the inception of the STEM Mentorship Camps programme five years ago, it has been noted that there is a big demand for the programme to reach more secondary school girls in the country. However, there is no data to support its effectiveness and impact. It is on this basis that working in close collaboration with the Kenya National Commission for UNESCO (KNATCOM), UNESCO coordinated a national assessment to document the impact of the programme and highlight the lessons learnt within the five years of its implementation. The data collected will inform policy making and address any relevant key issues relating to enhancing STEM Education and particularly in implementing a STEM Mentorship Programme in the country. It has been noted that the current structure of the Programme may not be effective in reaching a larger number of students and schools to register a significant impact. It is therefore necessary to assess the current programme to inform scaling up strategies and determine financing modalities that would make it more cost effective to have the desired impact.

1.4. Scope and Limitations of the Assignment

The assignment targeted secondary school students (including those who have transited to higher education level), STEM teachers, Head Teachers, Ministry of Education officials, Tertiary Institutions, Industry as well as the STEM Role models that were involved in the Programme as mentors. The assessment covered the eight regions that had participated in the programme, namely, Nairobi, Coast, South and North Rift regions, Upper and Lower Eastern regions as well as the Western and Nyanza regions.

The advent of COVID-19 pandemic that caused unprecedented disruptions globally, also impacted on the assessment assignment and resulted in the use of technology for data collection. Online questionnaire survey, telephone calls and short message service (SMS) were deployed to facilitate data collection. This interfered with the direct interaction with the beneficiaries of the programme as had been intended in the design of the assessment.

Literature Review 2

2.1 Introduction

The complex and dynamic challenges being experienced in the world today demand a workforce with the relevant knowledge and skills to solve problems through innovative approaches by applying technologies like data analytics, artificial intelligence, cloud computing, robotics among others. The opportunity for developing such skills are found in Science, Technology, Engineering and Mathematics disciplines, collectively referred to as STEM. According to the Advocate 2019, there are benefits associated with STEM education which include: fostering ingenuity and creativity; building resilience; encouraging experimentation; encouraging teamwork; encouraging knowledge application; encouraging technology use; teaching problem solving and encouraging adaption.

Students in the laboratory at Maseno University during the Exposure to the Learning Environment.
Photo/UNESCO/Ochanda

Although other subjects are important, to succeed in the technology driven era today, there is certainly need for skills in STEM. STEM education initiatives should aim at:

a. Creating excitement and interest in STEM subjects and careers;
b. Improving academic achievement as well as increasing knowledge in STEM subjects;
c. Supporting equity and equality, where the former aims at promoting students who are disadvantaged or underrepresented due to socio- economic backgrounds, culture, gender and the later focuses on ensuring that all students can achieve their highest potential in STEM

2.2 Global, Regional and National Outlook

The global vision is espoused in the Sustainable Development Goals (SDGs) whose clarion call is to “Leave No One Behind”. In order to realize the SDGs by 2030 there will be need for a paradigm shift in problem solving approaches recognizing that the concept of the SDGs is global but action is localized. The skills of the 21st Century, namely, creative problem solving, ability to innovate and creative thinking are therefore very important. Evidently, a multidisciplinary approach is desirable and hence the enabler for these skills and knowledge are the STEM disciplines.

Africa has the highest youthful population (15-24 years) globally at 40% with Europe having the oldest population (over 50 years) at 40%. In this 21st Century that is technology driven and recognizing that youth are the most avid users of technology, it is possible to harness this energy for useful purposes with the aim of addressing the myriad of life challenges. This can be realized by equipping them with the necessary skills and encouraging them to be part of solutions for the many societal problems. Leveraging on technology to solve environmental problems, designing applications for health, agriculture and education, among many others are just few examples where the youth can be encouraged to make contributions.

Students enjoying a coding lesson during the STEM Camps.
Photo/UNESCO/Ochanda

Different initiatives that recognize STEM exist, for instance, Siemens Stiftung offers high-quality science and technology education to provide young learners with the relevant knowledge to understand scientific and technical interrelations. "STEM and creativity" into its international education programme by integrating design thinking as a new teaching method in STEM lessons. Thus, with the "Design Thinking in STEM" project, Siemens Stiftung combines STEM education with creative processes to encourage innovative thinking among young people. The project aims at developing approaches for teaching these abilities in science and technology lessons. The design thinking method encourages students to address challenges with a sense of empathy, viewing a problem through the eyes of someone who is confronting it. Through interdisciplinary teamwork, ideas and approaches are turned into physical prototypes early in the process to be tested and evaluated.

STEM is undeniably a key driver for world economies contributing to the overall wealth of countries. The population in Africa is 17% of the world's population with a demographic asset of the youthful population at 60% under 25. This asset of youth can be tapped into imparting the relevant skills to leapfrog Africa to be the next economic giant. Of importance, is to ensure the education system is reengineered to accommodate the skills and knowledge of the 21st century that are technology driven. Indeed, African Union's Agenda 2063 whose clarion call is "The Africa We Want", aspires that by 2063 Africa will be a prosperous continent endowed with resources and the means to drive its own development agenda. To achieve this, it recognizes that a well-educated and skilled citizen for all anchored-on science, technology and innovation is needed.

However, Africa continues to lag behind in STEM capacity. This is largely attributed to lack of basic and critical infrastructure as well as resources relevant for enhancing STEM education. Indeed, a report by UNESCO's 2018 Global Education Monitoring Report indicates that only 22% of primary schools in sub-Saharan Africa have access to electricity. This problem is exacerbated by the fact that African countries commit little or no resources to science and research whereas other successful economies set aside up to 4% of their GDP to scientific research. Support to scientific research contributes to improved

STEM performance and subsequently economic development.

The African Development Bank reports that less than 25% of African Higher Education students are in STEM fields. This means that there is a general lack of domestic STEM Workforce leading to outsourcing of experts from other countries like the U.S.A, Europe, China, and India. A case in point is the current presence of China in development projects in Africa. Specifically, in 2014, Chinese construction teams travelled to Kenya to construct the Standard Gauge Railway. Further, most African countries rely on international support for development projects, which in the long run end up benefitting the donor.

Having recognized this, the African Union in the Science and Technology Consolidated Plan of Action is impressing upon its Member States to commit 1% of their GDP on research and development to enhance STEM innovations.

Improving STEM education in Africa and ensuring availability of adequate resources in learning institutions will require the collaborative work of governments, organizations, communities, businesses, and individuals. Additionally, it will lead to more successful STEM job acquisition in the future. Although it currently falls behind other regions in STEM, Africa's demographic makeup and untapped potential give it an advantage moving forward. Africa is in a prime position to educate a new highly skilled workforce (particularly with STEM skills), grow its economy and compete with some of the world's biggest players.

Kenya's development programme strategy is anchored on the Vision 2030 with three key pillars namely Economic, Social and Political. Among the identified foundational key sectors is Science, Technology and Innovation. Science, Technology and Innovation are recognized nationally and globally as essential for the economic transformation, growth and competitiveness of Kenya and are also key components of social integration, sustainable development and poverty eradication. Implementation of relevant Science, Technology and Innovation strategies in Kenya must be successfully delivered in order to achieve the goals set under Kenya's development blue print - Vision 2030.

Students being taught about tea processing at the Kenya Tea Research Institute in Kericho.
Photo/UNESCO/Ochanda

2.3 Mentoring in STEM

The role of mentoring may involve developing certain skills or competencies, psychosocial support and guide for career development (Haggard et al., 2011). In addition, mentors can be role models and providing advice based on subject -specific expertise (English, 2017). Mentoring can take different forms namely peer and group (Kroll, 2016).

According to Montgomery, 2017, mentoring is a journey with different stages as shown in figure 2.1. It starts by self-reflection where the need for mentoring in terms of what,

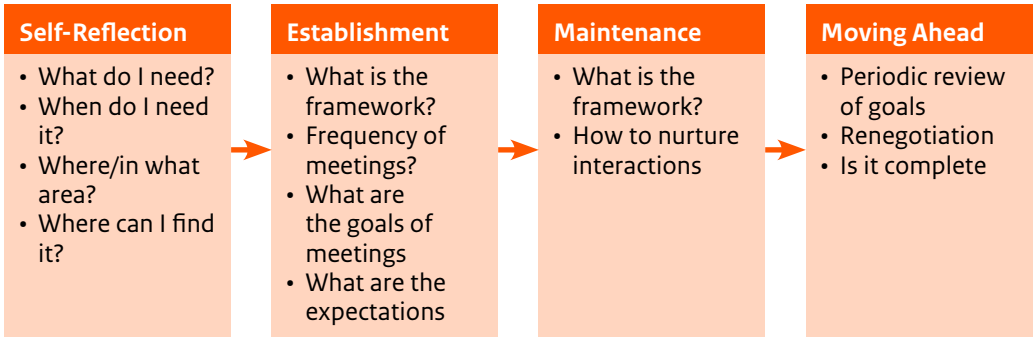

Figure 2.1: Mentoring Road Map (Montgomery, 2017)

when, area and where to find the mentorship is defined. Once that has been addressed a framework of engagement is establishment outlining the frequency and the goals of meetings as well as the expectations. To sustain the mentorship, it is important to have a maintenance strategy with a clear framework and with provisions on how the interactions will be nurtured. Periodic review of goals, renegotiations and assessing whether the mentoring has achieved its goal and therefore need to close is the last stage.

Within the context of STEM, mentoring can be viewed as a catalyst capable of unleashing one's potential for discovery, curiosity, and participation in STEM. This leads to improvement of students' skills in STEM which eventually can influence and shape careers in the STEM fields. Given the importance of mentoring in STEM there is need to have a structured programme.

In general, STEM mentoring programme goals are meant to generate interest and excitement in STEM disciplines that lead to successful STEM careers and retention. A positive and trusting relationship between the mentor and mentee is vital for an improved outcome (Stelter et. al., 2020).

The UNESCO/GoK STEM mentoring programme is unique. It recognizes the need to bring on board different actors to expose secondary school girls to all facets of STEM namely, career talks in STEM, visit to STEM learning Environments, visit to the Industry, Coding and robotics as well as testing their skills in STEM in creating innovations to solve real life challenges. Making career choices in STEM as well as life and Survival skills are viewed as enablers for an all-round STEM mentored secondary school girl. The components of the UNESCO/GoK STEM mentoring programmes and their inter-linkages are shown in table 2.1.

Table 2.1: UNESCO/GoK STEM Mentoring Programme Components

Outcome	A Model of a UNESCO/GoK STEM Mentored Kenyan Secondary School Girl			
Testing	Innovations and Problem-Solving Skills			
Knowledge and Skills sharing	Career Talks in STEM	Exposure to STEM Learning Environments	Exposure to Application of STEM in Industry	Coding & Robotics
Enablers	Making Career Choices in STEM			
	Life and Survival Skills			

Description of the Methodology

3

3.1 Background

This section describes the methodology for the assessment of the impact of the STEM programme in secondary schools in Kenya. The technical concept for carrying out the exercise focusing on the tools to be used which is largely questionnaires is discussed. A triangulated approach was adopted in data collection including focused group discussions. In terms of the geographical extent the assessment involved the eight (8) regions covered by the programme, namely, Nairobi, Coast, Nyanza, South and North Rift regions, Upper and Lower Eastern regions as well as the Western region.

3.2 Methodology

The methodology involved four (4) phases namely concept development, Data Collection, Data Analysis and Interpretation, recommendations and validation. Figure 3.1 gives an outline of the methodology in terms of the phases, key activities and with respect to the key report deliverables.

3.2.1 Concept Development

This entailed the consultant engaging the client and key partners to strategize on the exercise. Among the issues discussed included seeking concurrence on the survey design

1. Concept development	• A kick off/inception meeting • Survey design (selectiion of the schools to be included; strategies for impact assessment) • Technical concept for carrying out the survey • Preparation of **inception report**
2. Data collection	• Developing and updating STEM database - County, Schools, Teachers • Formulation and formatting of questionnaires • Pre-testing of questionnaires and training of research assistants • Distribution and collection of questionnaires (Triangulated Approach) • Preparation of **preliminary report**
3. Data analysis, interpretation	• Coding for the responses to open questions and Focus Group Discussions • Data entry and data editing with corresponding quality control • Data analysis and interpretation • Preparation of **draft final report**
4. Making recommendations and validation	• Making recommendations • Final meeting involving client and all stakeholders • **Final report preparation**

Figure 3.1: Outline of the methodology

in terms of schools to be included and how impact was to be measured. Further, agreeing on the roles of each actor in the exercise to ensure timely delivery of the results.

3.2.2 Data Collection

This phase involved first developing and populating the STEM database in terms of all the details regarding the Counties, Schools, Students and Teachers where this exercise has been conducted. Annex A contains the UNESCO-GoK STEM Mentorship Programme Data. Specifically Annex A1 shows the summary of Students Mentored, Annex A2 is the summary of the Number of Counties, Schools and Students Mentored Since 2014, Annex A3 contains the Model Schools of the STEM Mentorship Programme Assessed, Annex A4 has Randomly Selected Schools for STEM Mentorship Programme Assessment and Annex A5 contains data on Summary of Teaching and Working Environments that participated in the STEM Mentorship Programme Since 2014

Formulation and formatting of the questionnaires targeting students (both still in school and those who have transited to tertiary institutions), teachers, head teachers, ministry of education officials, academic institutions as well as Industry were done. The questionnaires were pre-tested with the identified Team for concurrence before administering them. Annex B shows the questionnaires formulated for the different target groups.

A total of 50 girls' secondary schools were targeted for the assessment. The consultant together with the officials from the Ministry of Education and KNATCOM agreed on how the schools were to be sampled. As proposed by the client, the schools targeted were based on the counties already covered and therefore both purposive and random sampling were employed.

A team from MoE, KNATCOM and NACOSTI was visiting each region and the identified schools where the students participated in the camps. The team administered the questionnaires formulated and tested as much data as possible collected from the respondents. Once all data was collected, the team presented the collected information to the consultant for analysis.

3.2.3 Data Analysis and Interpretation

a) Generating GIS Maps

The spatial location of all the regions, counties and schools was collected, verified and mapped. All additional attribute data for example, the number of schools per county that participated in the programme, number of students and teachers mentored per county was incorporated. This was to enable a comprehensive STEM GIS database of the UNESCO/GoK to be developed.

Maps were generated showing:

i. Regions and respective counties in respective years
ii. Counties and schools covered in respective years highlighting:
   - Host school and number of students mentored
   - Number of teachers sensitized
iii. Model STEM Camp Schools for Assessment
iv. Randomly Identified Schools for Assessment
v. For every Camp there were institutions visited and these fell into two categories namely,
   - Academic
   - Industry

b) Processing of the Questionnaires

This involved:

i. Coding for the responses to open questions: All open-ended questions and the corresponding open responses were coded through the development of the code list after a thorough review and categorization of the responses. This is important to facilitate analysis.
ii. Data entry and data editing with corresponding quality control: Data entry was assigned to the research assistants with sufficient quality control by the consultant.
iii. Data analysis and interpretation: Data from the tools extracted was analyzed using appropriate statistical software. The focus of the analysis was to extract both quantitative and qualitative information. This included quantifying the number of girls and teachers mentored since the STEM programme started in 2014, schools that participated in the programme and the distribution of the classes of the students, the impact of the programme in influencing their attitudes towards STEM subjects, choice of careers, teachers attitude towards teaching their respective STEM subjects, general performance after the STEM programme among many others.

Results 4

The results emanating from the assessment exercise are meant to inform policy and strategic planning on STEM Education by Education and Science sector policy makers. In addition, this will also support UNESCO's future interventions to advance STEM education in its other Member States. This chapter presents the results aligned to the objectives set out.

4.1 Summary of the UNESCO/GoK STEM Mentorship Camps

4.1.1 Host School and County, Period of Camp As Well As Participating Counties

Table 4.1 summarizes the STEM Mentorship Camps in terms of the host school and county, epoch marking the start and end date of the STEM programme as well as the respective participating counties

Table 4.1: UNESCO/GoK STEM Mentorship Camps

S/No	Host School	Host County	Start Date	End Date	Counties
1	St Georges Girls Nairobi	Nairobi	9/11/2014	15/11/2014	Kajiado Narok Nakuru Laikipia Makueni
2	Moi Girls High School, Eldoret	Uasin Gishu	26/4/2015	2/5/2015	Trans-Nzoia, Elgeyo Marakwet Baringo Uasin Gishu West Pokot Nandi
3	Kisumu Girls	Kisumu	22/11/2015	28/11/2015	Kisumu Homa Bay Nyamira Siaya Migori Kisii
4	Mama Ngina Girls High School	Mombasa	11/4/2016	16/4/2016	Mombasa Kilifi Kwale Tana River Taita Taveta Lamu Garissa

S/No	Host School	Host County	Start Date	End Date	Counties
5	Kaaga Girls High School	Meru	9/4/2017	15/4/2017	Meru Embu TharakaNithi Isiolo Marsabit Wajir Mandera
6	Machakos Girls, High School	Machakos	9/4/2018	14/4/2018	Machakos Kitui Makueni Kajiado
7	Mukumu Girls	Kakamega	7/4/2019	13/4/2019	Kakamega Busia Bungoma Vihiga
8	Moi Tea Girls Secondary School	Kericho	22/4/2019	28/4/2019	Bomet Nakuru Narok Kericho

A total of eight UNESCO/GoK STEM Mentorship camps have been held in different parts of the country during the months of April and November. As shown in table 4.2 most of them (specifically 75%), took place in the month of April whereas 25% took place in November to comply with the new government directive of no activities in schools during the third term due to national exams.

Table 4.2: Period of UNESCO/GoK STEM Mentorship Camps

Period of Camp	Number	%
April	6	75
November	2	25
Total	**8**	**100**

A further analysis shows that some Counties participated in more than one UNESCO/GoK STEM Mentorship Programme as shown in Table 4.3. The factors considered in choosing the counties to participate included the choice of location of the host school, adequacy of facilities to accommodate the students as well as accessibility.

In total four (4) counties namely Kajiado, Narok, Nakuru, Makueni appeared in more than one UNESCO/GoK STEM Mentorship camp. It should however be noted that no school was repeated in any of the UNESCO/GoK STEM Mentorship camps. Further all the said counties have participated twice only.

Eight (8) regions with fourty four (44) counties have participated in the UNESCO/GoK STEM Mentorship Camps since 2014 as shown in figure 4.1. The regions in question are namely Nairobi, North Rift, Nyanza, Coast, Upper Eastern, Lower Eastern, Western and South Rift. The number of counties that have participated in the UNESCO/GoK STEM Mentorship Programme range from four (4) to seven (7) with Western and South Rift regions having four (4) each, Nairobi, North Rift and Nyanza six (6) each whereas Coast and Upper Eastern regions have seven (7) each.

Table 4.3: Counties in more than one STEM Mentorship Programme

Repeated Counties	Host School	Host County	Period of Camp
Kajiado	St. Georges	Nairobi	November, 2014
	Machakos Girls	Machakos	April, 2018
Narok	St. Georges	Nairobi	November, 2014
	Moi Tea Girls	Kericho	April, 2019
Nakuru	St. Georges	Nairobi	November, 2014
	Moi Tea Girls	Kericho	April, 2019
Makueni	St. Georges	Nairobi	November, 2014
	Machakos Girls	Machakos	April, 2018

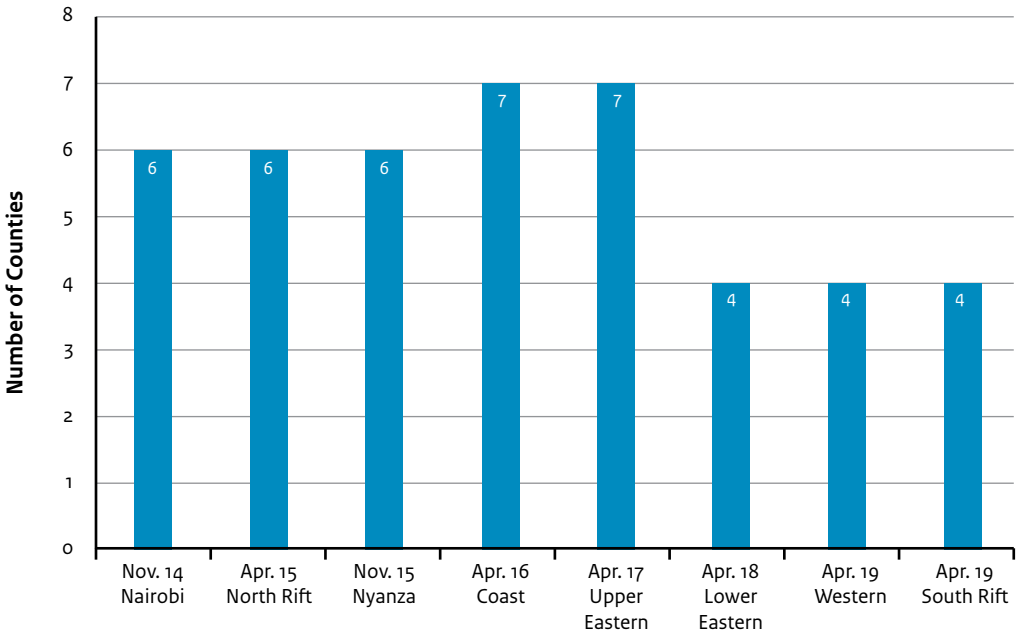

Figure 4.1: Regional and County Distribution of the UNESCO/GoK STEM Mentorship Camps

4.1.2 Regional Distribution of the STEM Mentorship Camps

A comparison of the number of schools and counties in the various UNESCO/GoK STEM Mentorship camps is presented in figure 4.2.

Evidently, there is no correlation between the number of counties and schools that participated in the STEM Mentorship Programme. For instance, the number of schools that participated in the STEM Mentorship Programme in the South Rift were twenty-five (25) from a total of four (4) counties, whereas the lower eastern had seventeen (17) schools from four (4) counties. Population density among other parameters like accessibility inform the location and number of schools in a given region or county.

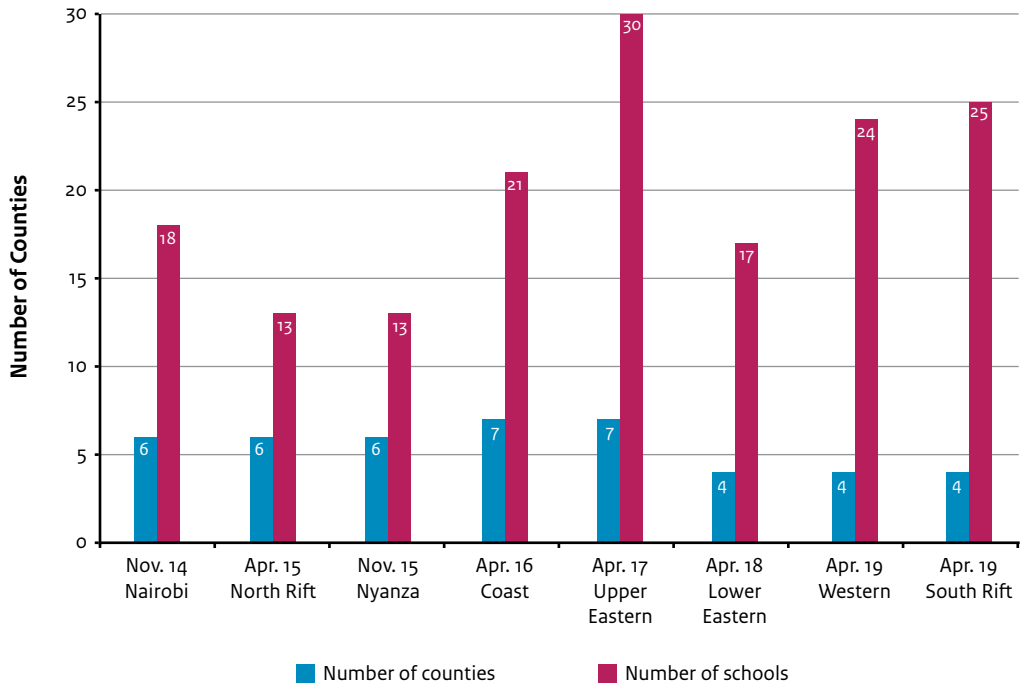

Figure 4.2: Number of Counties and Schools in the UNESCO/GoK STEM Mentorship Programme

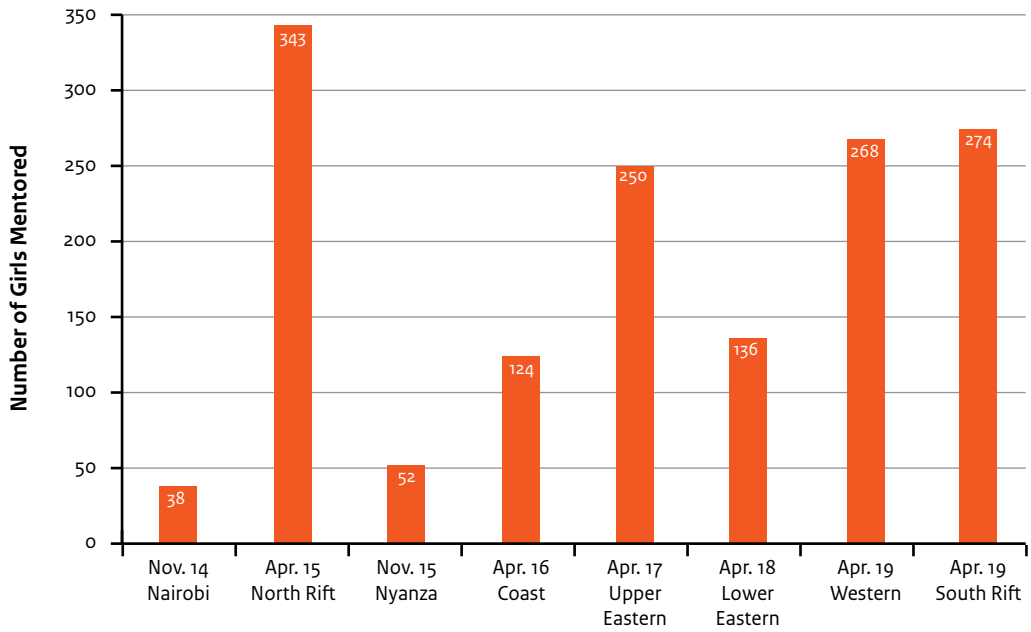

Figure 4.3: Number of Students Mentored in the UNESCO/GoK STEM Mentorship Programme

Another important factor in the UNESCO/GoK STEM Mentorship Programme was the number of students that participated in the camps since its inception in 2014. Figure 4.3 shows the number of students mentored in all the eight (8) regions.

From figure 4.3, it is evident that the April 2015 UNESCO/GoK STEM Mentorship Programme held in the North Rift region attracted the largest number of girls with the figure standing at 343 whereas Nairobi (November, 2014) with 38 and Nyanza (November, 2015) with 52 regions had the least.

4.2 Spatial Representation of the UNESCO/GoK STEM Mentorship Programme

4.2.1 Regions and Counties Covered in the UNESCO/GoK STEM Mentorship Programme

The UNESCO/GoK STEM Mentorship Programme which started in 2014 has had a footprint in different regions and counties in the country as shown in figure 4.4.

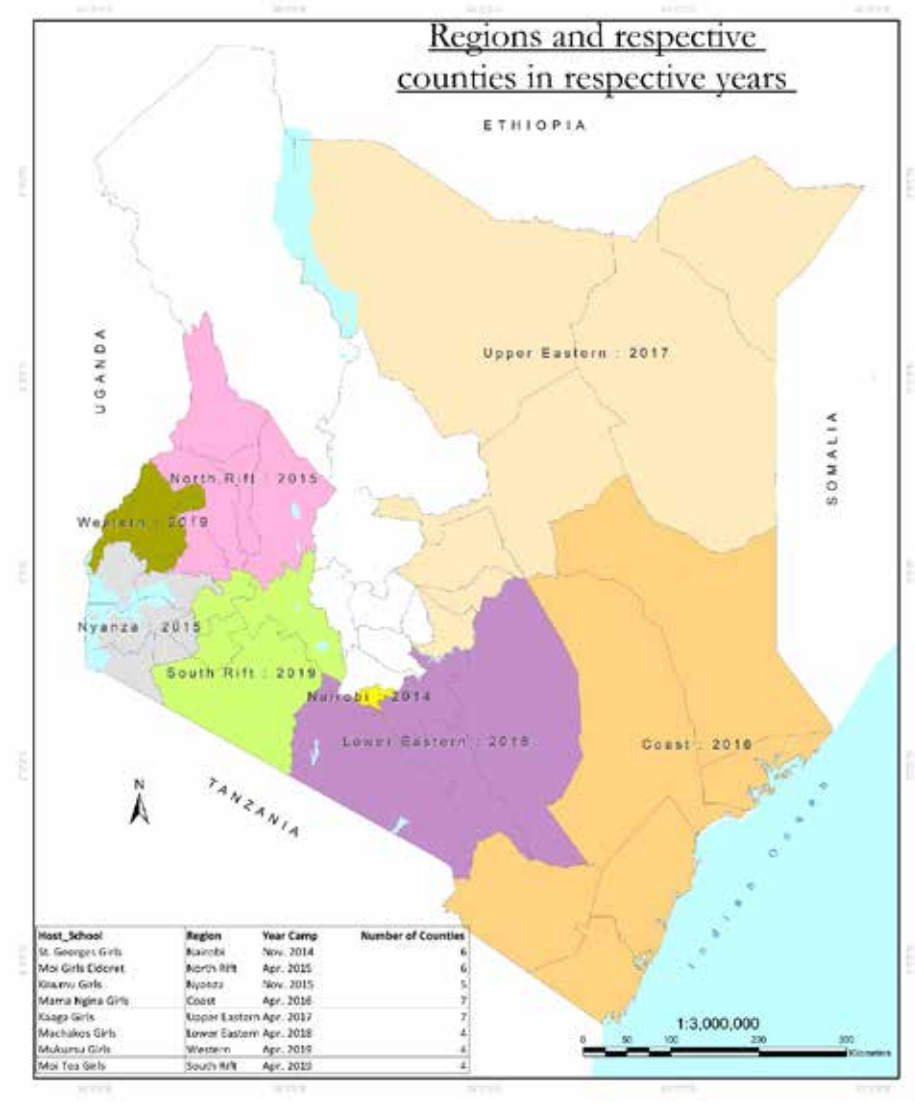

Figure 4.4: Regions and Counties in UNESCO/GoK STEM Mentorship Programme

The map shows the regions covered namely, Nairobi in 2014; North Rift and Nyanza in 2015; Coast in 2016; Upper Eastern 2017; Lower Eastern in 2018; Western and South Rift in 2019.

4.2.2. Counties and Schools Covered in Respective Years

A total of eight regions have been covered in the UNESCO/GoK STEM Mentorship Programme since 2014. Figures 4.5 to 4.12 show the disaggregated data in a map for all the STEM camps held representing the host institution, schools and number of students that participated.

The first UNESCO/GoK STEM mentorship camp was held in Nairobi and hosted by St. Georges Girls High School, Nairobi. The map in figure 4.5 shows the location of the schools that participated in this camp and the number of girls each school brought.

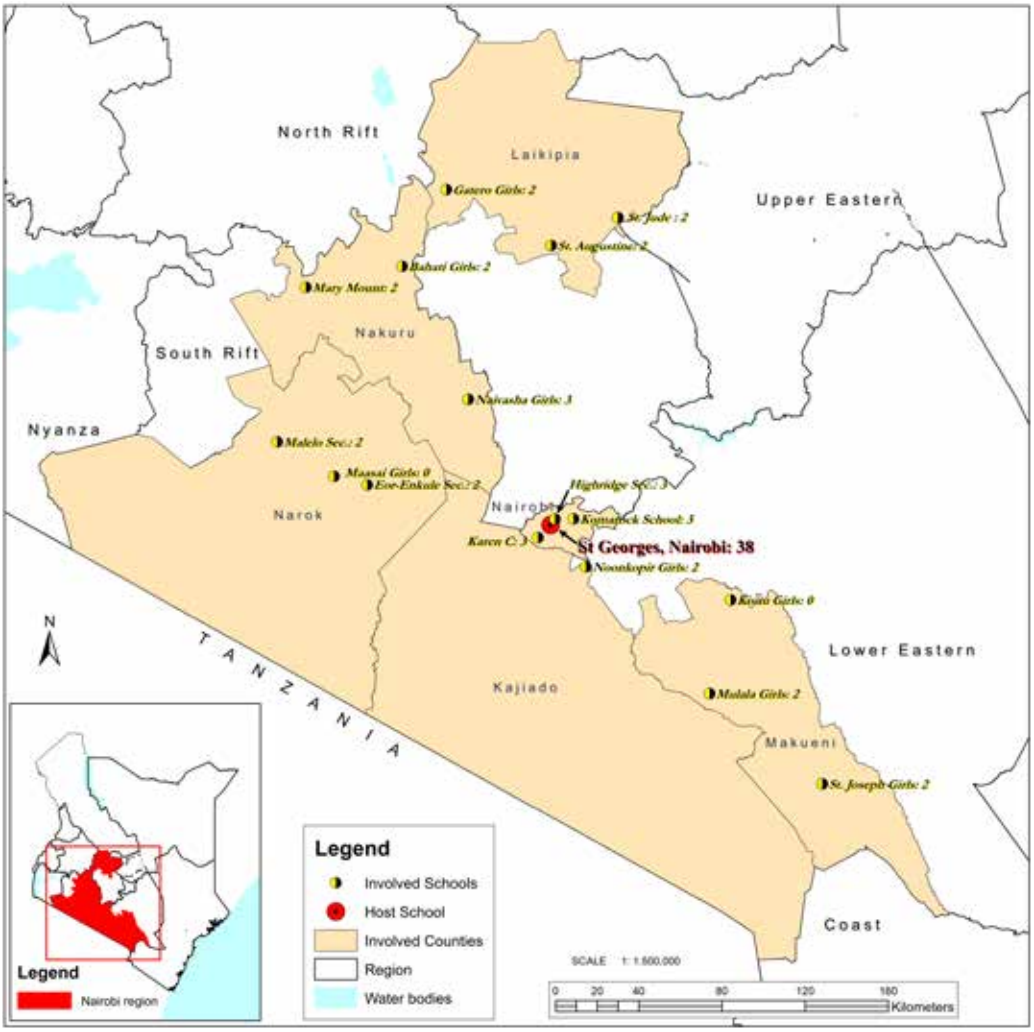

Figure 4.5: Nairobi Region UNESCO/GoK Mentorship STEM Camp (2014, November)

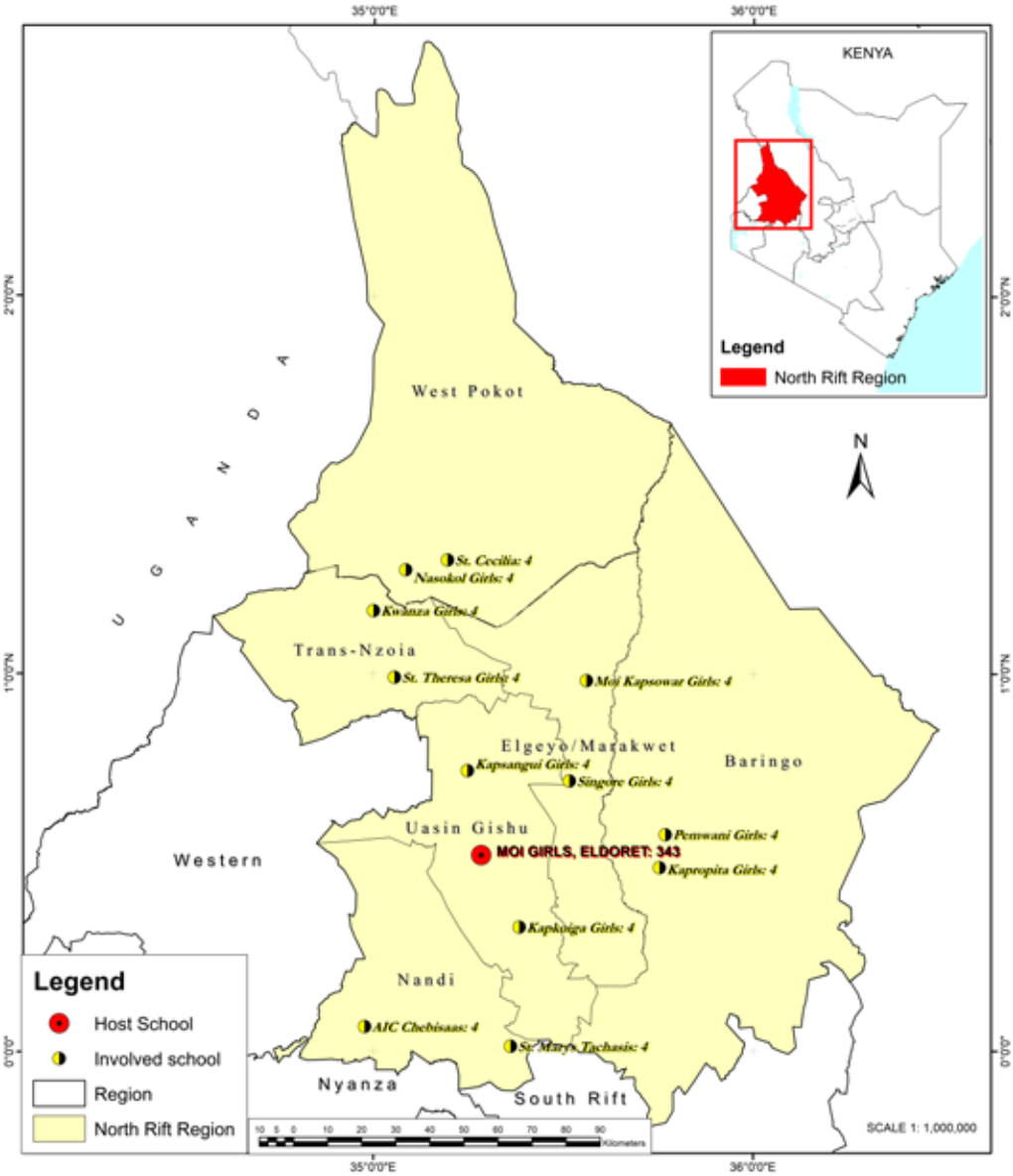

Figure 4.6: North Rift Region UNESCO/GoK STEM Mentorship Camp (2015, April)

In April 2015, the UNESCO/GoK STEM Mentorship Camp was held in the North Rift Region and hosted by Moi Girls High School in Eldoret. A total of 343 secondary school girls participated in the camp and spatial distribution of schools together with the number of girls is shown in figure 4.6.

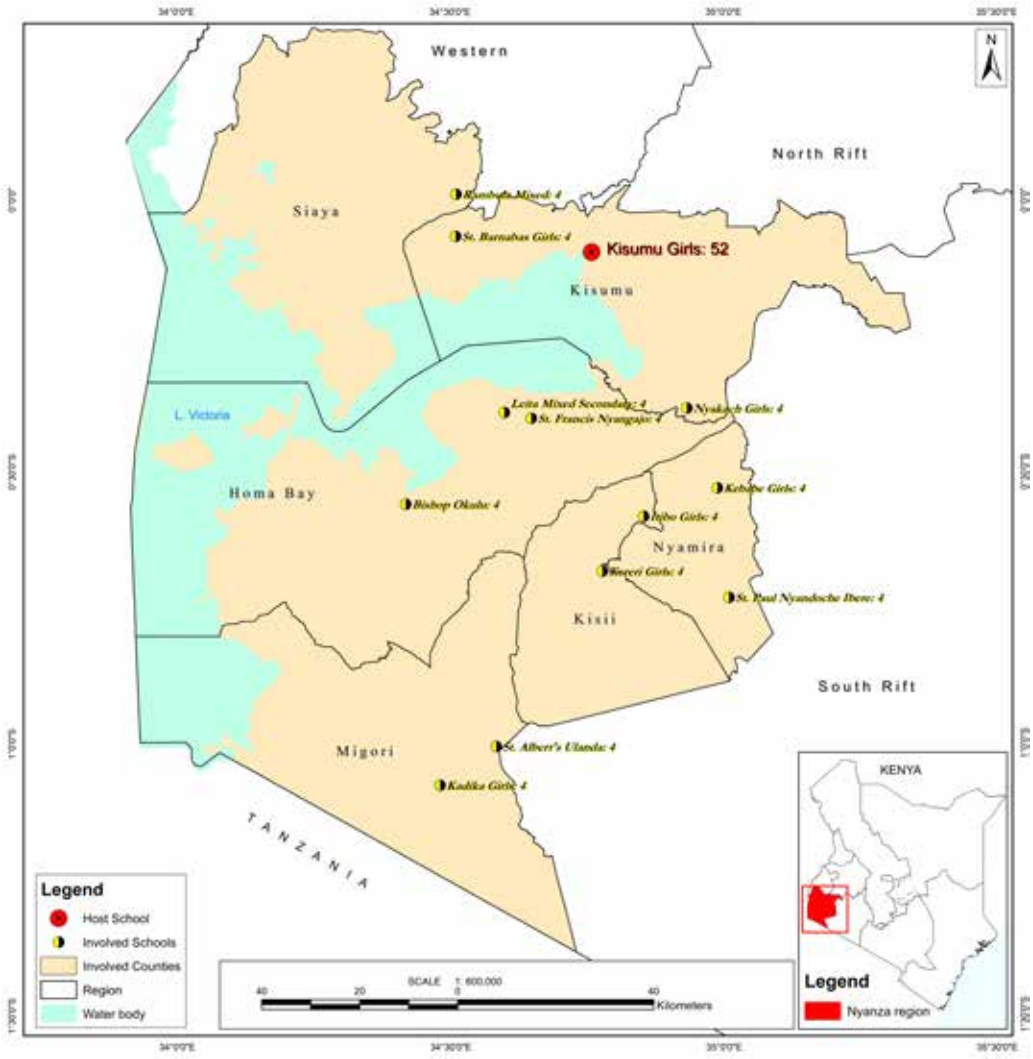

Figure 4.7: Nyanza Region UNESCO/GoK STEM Mentorship Camp (2015, November)

In November 2015, the UNESCO/GoK STEM Mentorship Programme was held in the Nyanza Region and hosted by Kisumu Girls High School. The spatial distribution of the schools that participated and the number of secondary school girls mentored is shown in figure 4.7.

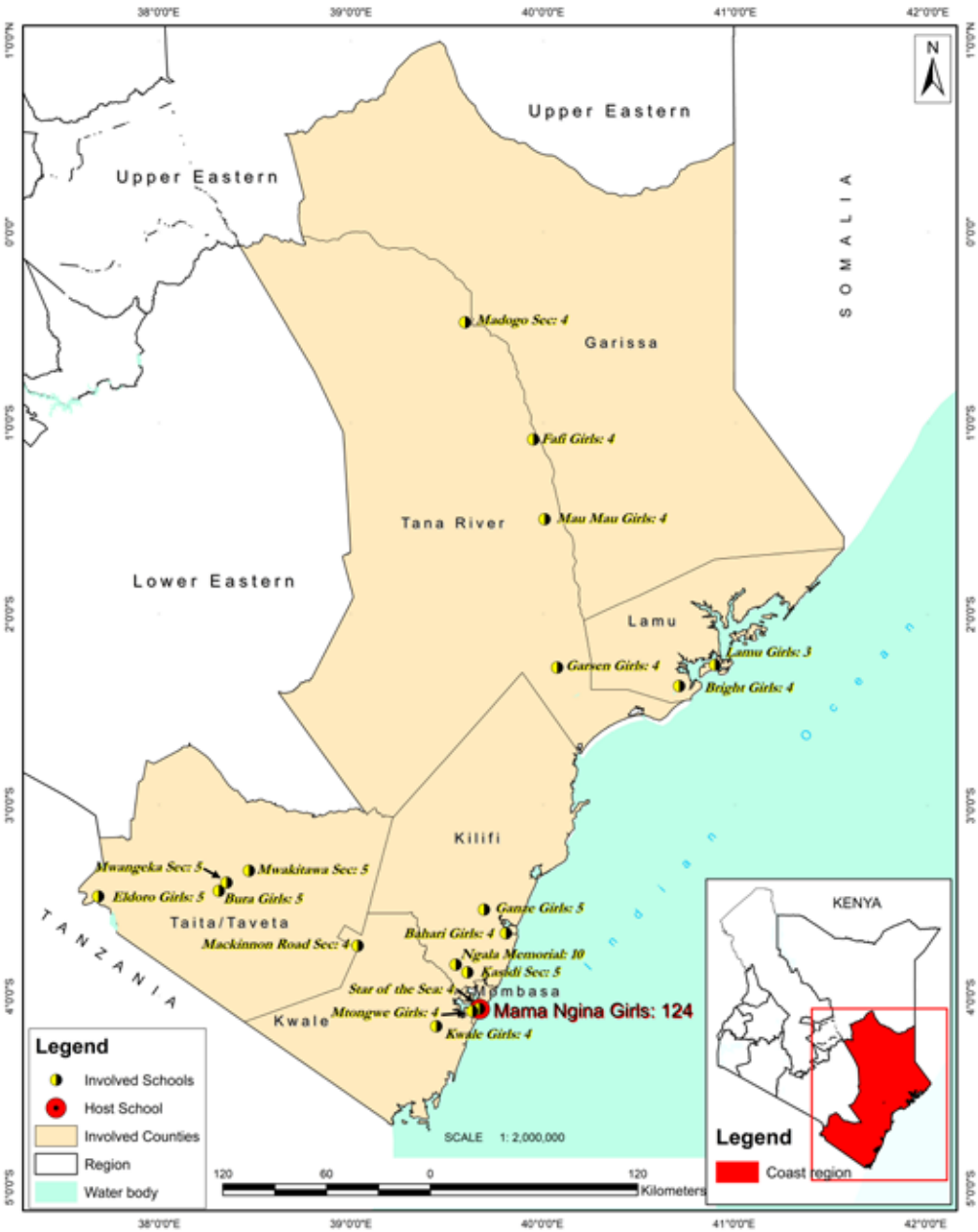

Figure 4.8: Coast Region UNESCO/GoK STEM Mentorship Camp (2016, April)

Mama Ngina Girls High School in the Coast Region hosted the UNESCO/GoK STEM Mentorship Programme in April 2016 with a total of 124 secondary school girls participating. The location of the schools and the number of secondary school girls from each participating school is shown in figure 4.8.

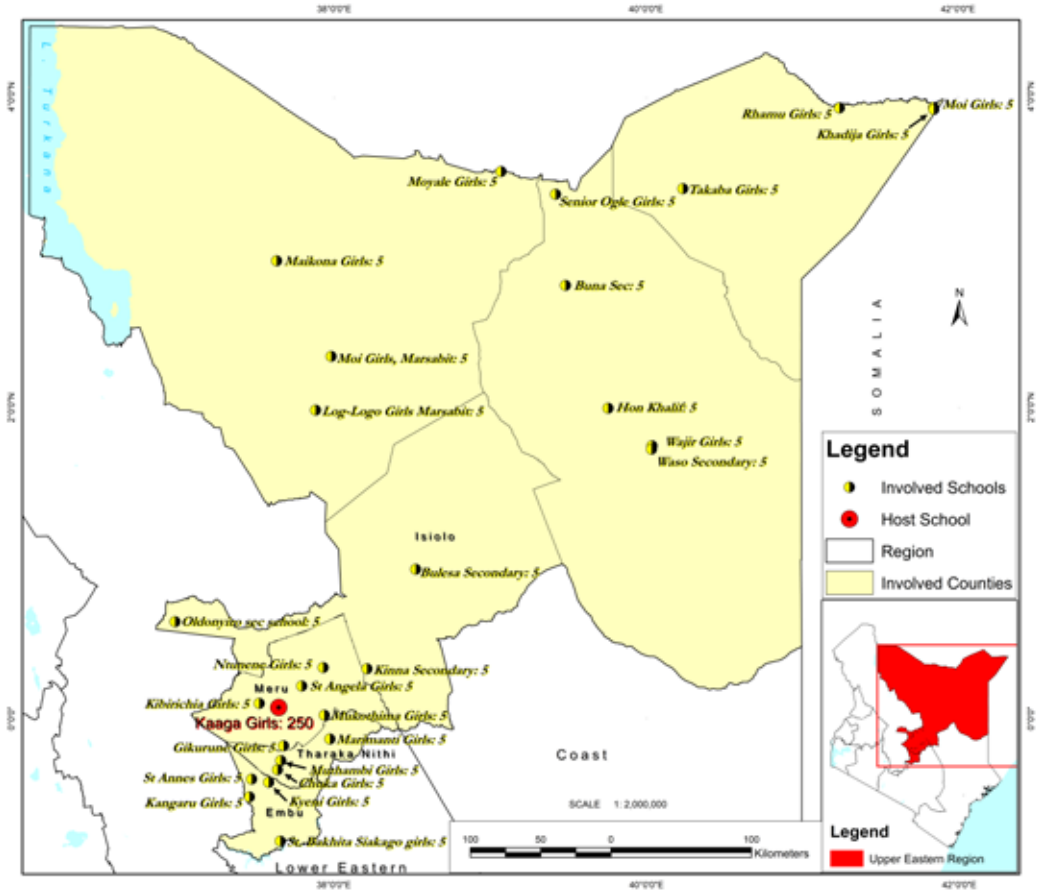

Figure 4.9: Upper Eastern Region UNESCO/GoK STEM Mentorship Camp (2017, April)

The Upper Eastern Region UNESCO/GoK STEM Mentorship Programme was hosted by Kaaga Girls High School, where a total of 250 secondary school girls participated. The participants were drawn from different schools as shown in figure 4.9 above.

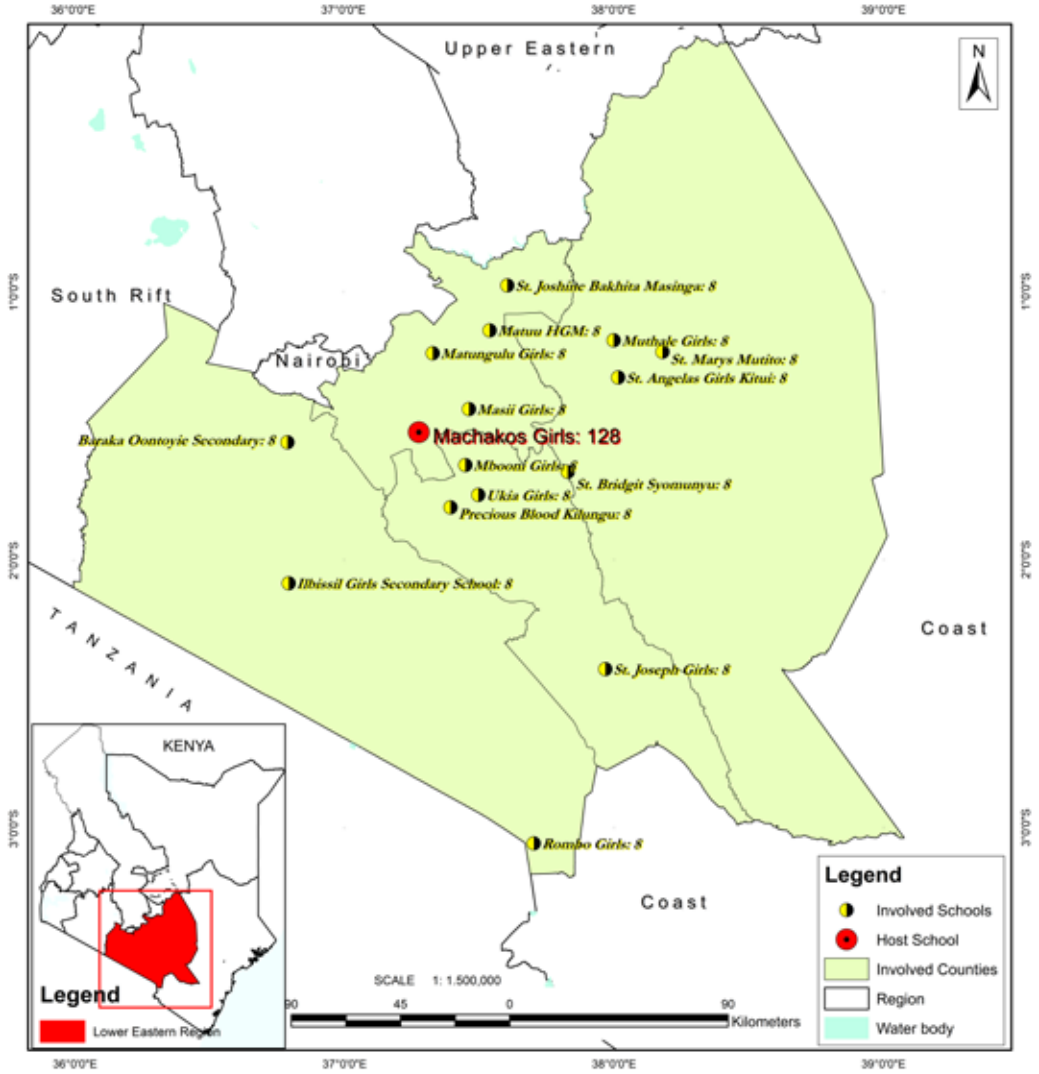

Figure 4.10: Lower Eastern Region UNESCO/GoK STEM Mentorship Camp (2018, April)

Machakos Girls High School was the host for the April 2018 UNESCO/GoK STEM Mentorship Programme in the Lower Eastern Region. A total of 128 secondary school girls participated drawn from different schools whose locations are shown in figure 4.10 above.

Figure 4.11: Western Eastern Region UNESCO/GoK STEM Mentorship Camp (2019, April)

The Western Region UNESCO/GoK STEM Mentorship Programme held in April 2019 was hosted by Mukumu Girls High School. A total of 268 secondary school girls participated in the mentorship from different schools as shown in figure 4.11 above.

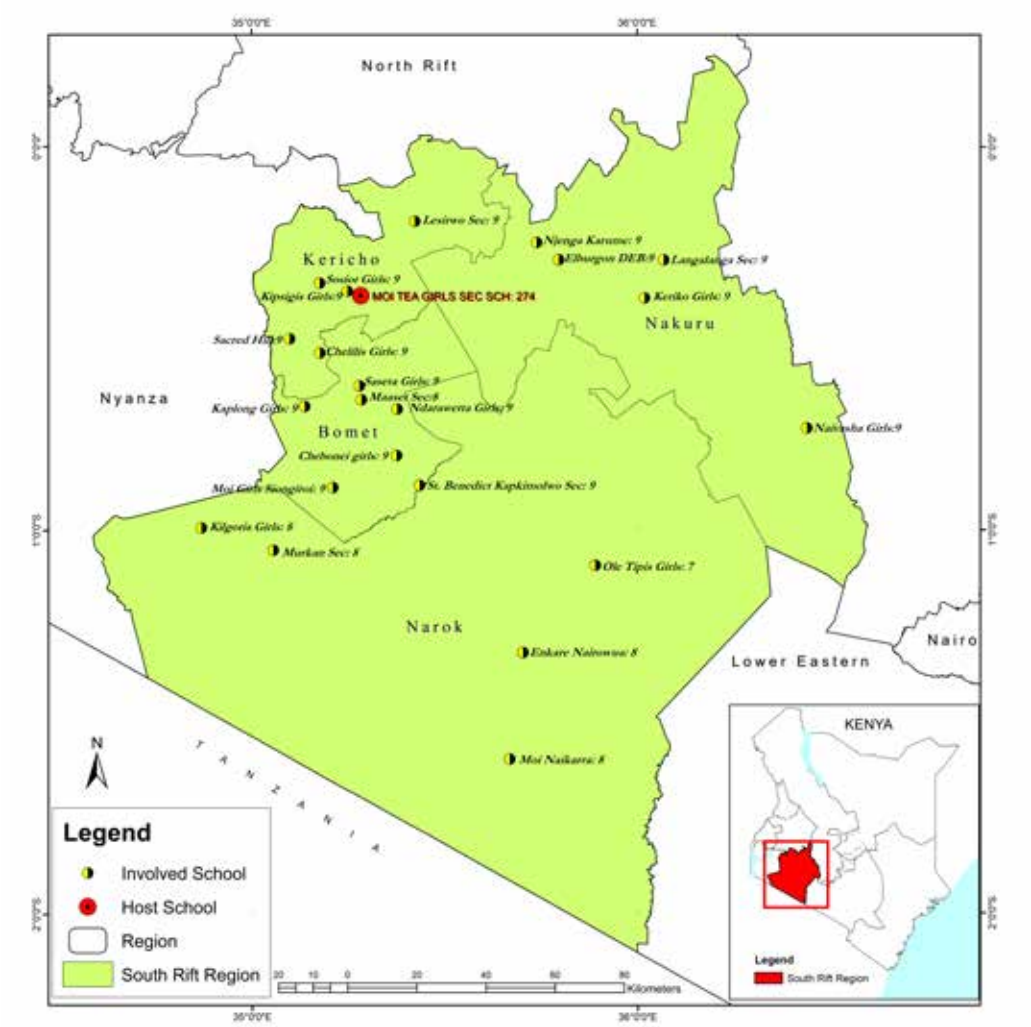

Figure 4.12: South Rift Region UNESCO/GoK STEM Mentorship Camp (2019, April)

The last UNESCO/GoK STEM Mentorship Camp Programme was hosted by Moi Tea Girls in the South Rift Region in April 2019. A total of 274 secondary school girls participated drawn from different schools as shown in figure 4.12 above.

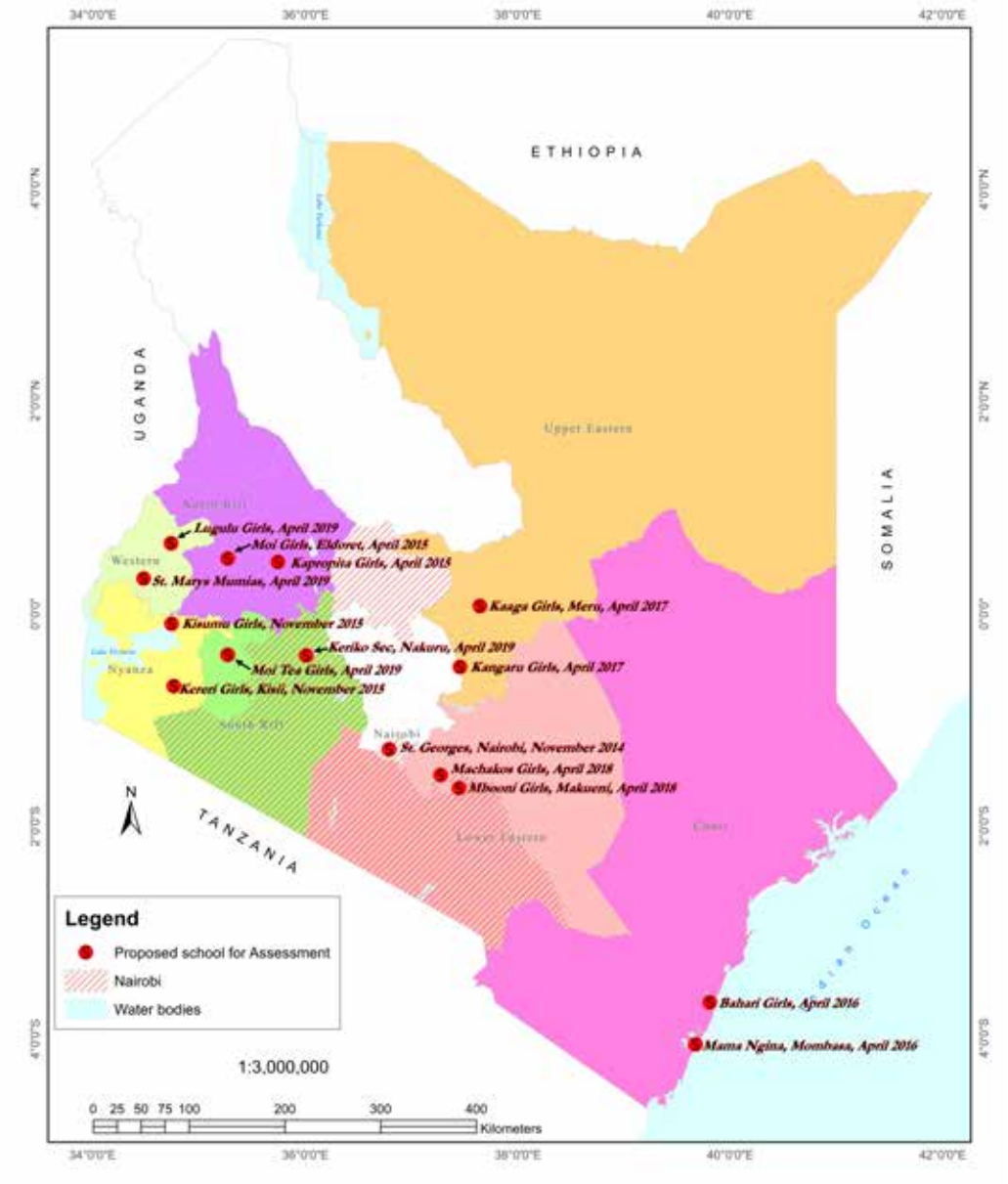

Figure 4.13: UNESCO/GoK STEM Mentorship Programme Host Schools

4.2.3 UNESCO/GoK STEM Schools

From Annex 3, a total of 15 secondary schools that were sampled for the assessment Camp Host are shown. The spatial distribution of these schools is represented in figure 4.13. These institutions consisted of all the host eight (8) and additional seven (7) schools. The map shows the concentration of these schools around the central part of the country.

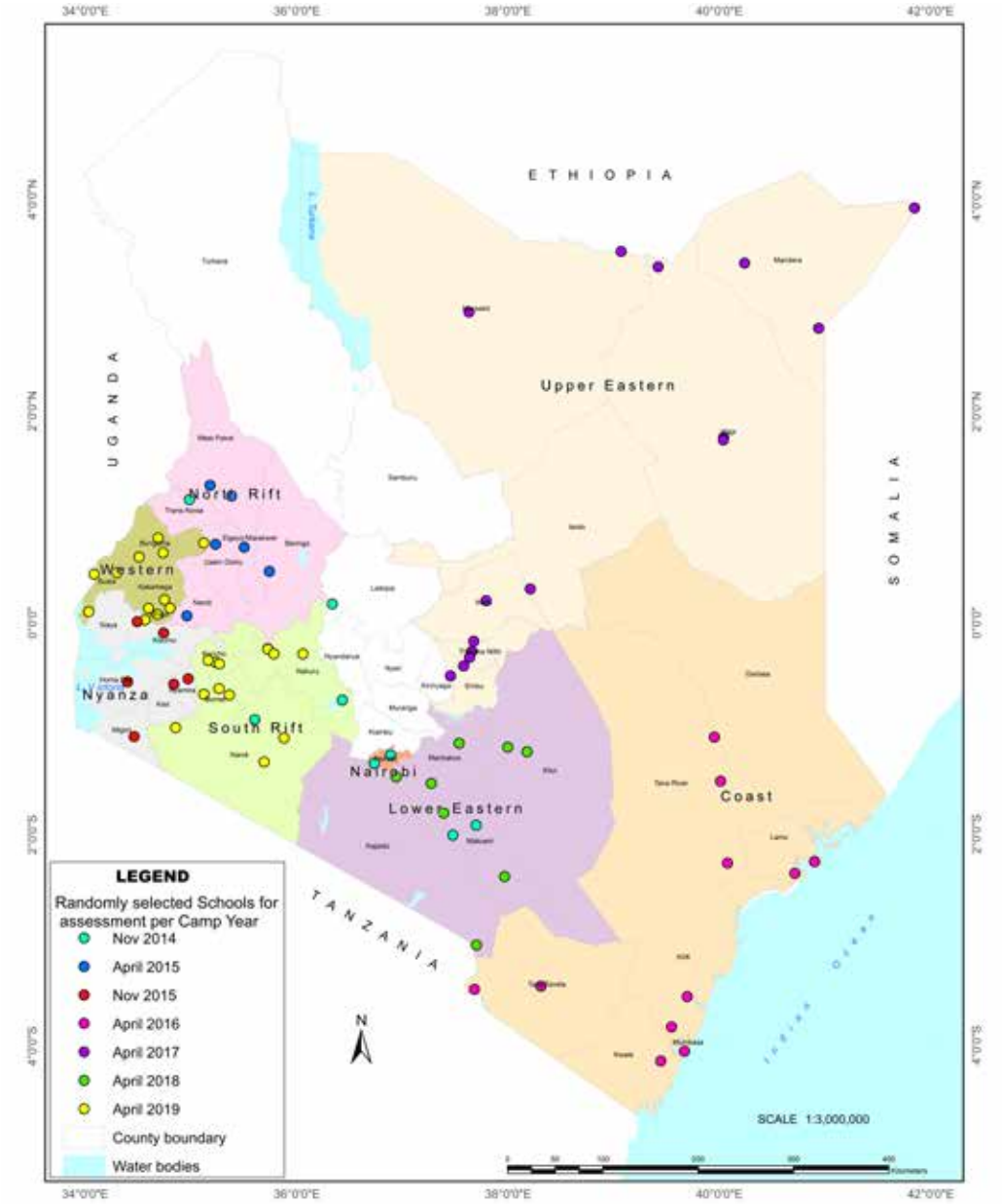

Figure 4.14: UNESCO/GoK Randomly Selected Schools Assessed

4.2.4 Randomly Selected Schools for UNESCO/GoK STEM Mentorship Programme Assessment

In addition to the fifteen (15) UNESCO/GoK STEM Camp Host schools, eighty (80) randomly sampled schools were also considered. The spatial distributions of these schools are shown in figure 4.14.

The randomly selected schools cover the entire spectrum of the UNESCO/GoK STEM Mentorship Programme from November 2014 to April 2019.

4.3 Impact of UNESCO/GoK STEM Mentorship Programme on students who have transited to Tertiary Institutions

4.3.1 Profiles of Students Who Transited to Tertiary Institutions

The assessment of the students' profile focussed on the county, academic profile and life after high school.

Figure 4.15 shows the responses received from the counties where students agreed to participate in the assessment.

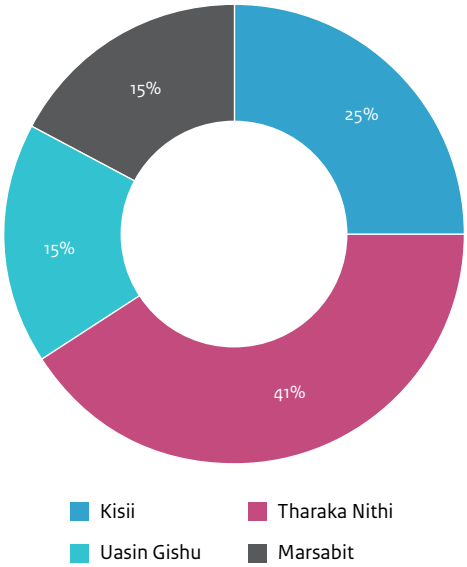

Figure 4.15: Counties where responses were received

Further, the assessment sought to establish the year the students completed their KCSE education and the responses received are shown in figure 4.16.

Majority of the students finished in 2018 at 42%, followed by 2019 at 34% with 2015, 2016 and 2017 at 8% each.

It was also important to establish the mean grade obtained by the students during their Kenya Certificate of Secondary Level Education (KCSE) examinations. The results obtained are shown in figure 4.17.

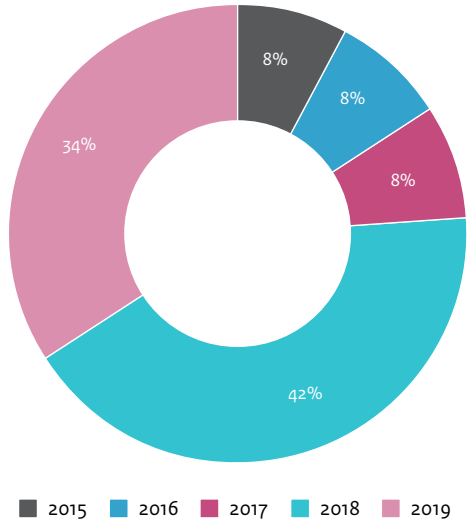

Figure 4.16: Year of KCSE completion

From the responses shown in figure 4.17, it is evident that majority of the students obtained a mean grade of B at 34% followed by B- at 25%, B+ at 17%, A, A- and C+ at 8% each.

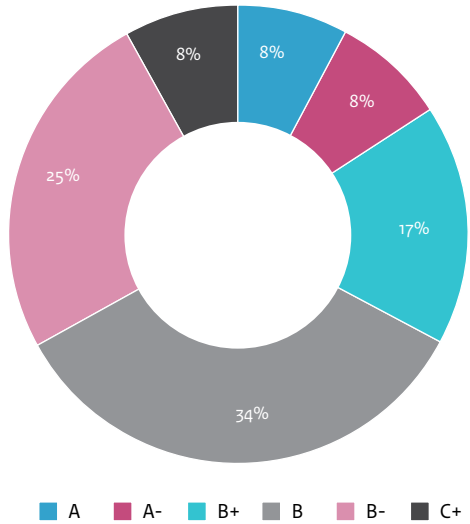

Figure 4.17: Mean Grade attained by the students at KCSE

Table 4.4: Various Institutions Students transited to after KCSE

S/No	Institution
1	Jomo Kenyatta University of Agriculture and Technology
2	Mount Kenya University
3	Kenya Medical Training College, Kisumu
4	University of Nairobi
5	Moi University
6	Chuka University
7	Taita Taveta University
8	Muranga University of Technology
9	Egerton University
10	Kenyatta University

In terms of life after high school, the assessment also sought to establish the institutions the students joined and table 4.4 shows these institutions.

It was also important to establish the courses the students are pursuing at the various institutions. Figure 4.18 shows the distribution in terms of uptake of the courses.

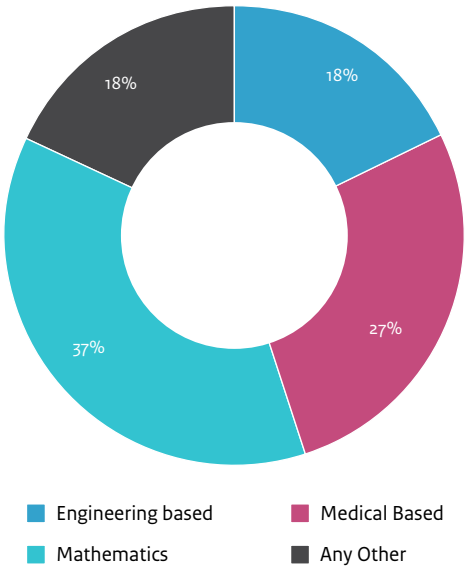

Figure 4.18: Courses Students are pursing at the various Tertiary Institutions

From figure 4.18, it is evident that majority are pursuing Mathematics at 37%, Medical Based Programmes at 27%, Engineering and Any other at 18%.

4.3.2 Perception of UNESCO/GoK STEM Mentorship Programme Through The Lens of students Who Have Transited to Tertiary Institutions

The perception of the UNESCO/GoK STEM Mentorship Programme through the lens of students who have transited to tertiary institutions was done by establishing whether the students participated in the programme, the year of participation, rating of the programme, impact on the attitude towards STEM subjects, performance in the STEM subjects and subsequently the influence on the choice of the course being pursued at the tertiary institution. In addition, it was also important to establish whether they intend to stay in the STEM field as a career.

In terms of whether the respondents participated in the UNESCO/GoK STEM Mentorship Programme, the results are shown in figure 4.19.

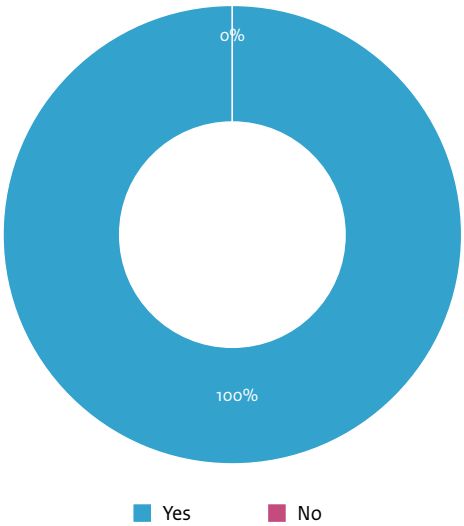

Figure 4.19: Participation by Students in Tertiary Institutions in the UNESCO/GoK STEM Mentorship Programme

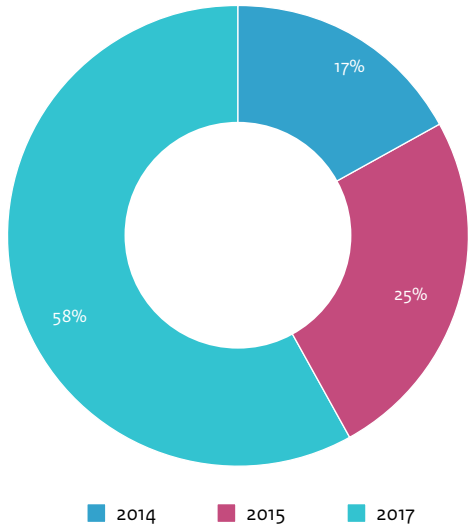

Figure 4.20: Year of participation by students in tertiary institutions in the UNESCO/GoK Mentorship Programme

From figure 4.19, it is evident that all the respondents did indeed participate in the UNESCO/GoK STEM Mentorship Programme.

Majority of respondents participated in 2017 at 58%, followed by 2015 at 25% and lastly 17% in 2014.

The year of participation in the UNESCO/GoK Mentorship Programme is shown in figure 4.20.

The rating of the UNESCO/GoK Mentorship Programme is shown in figure 4.21.

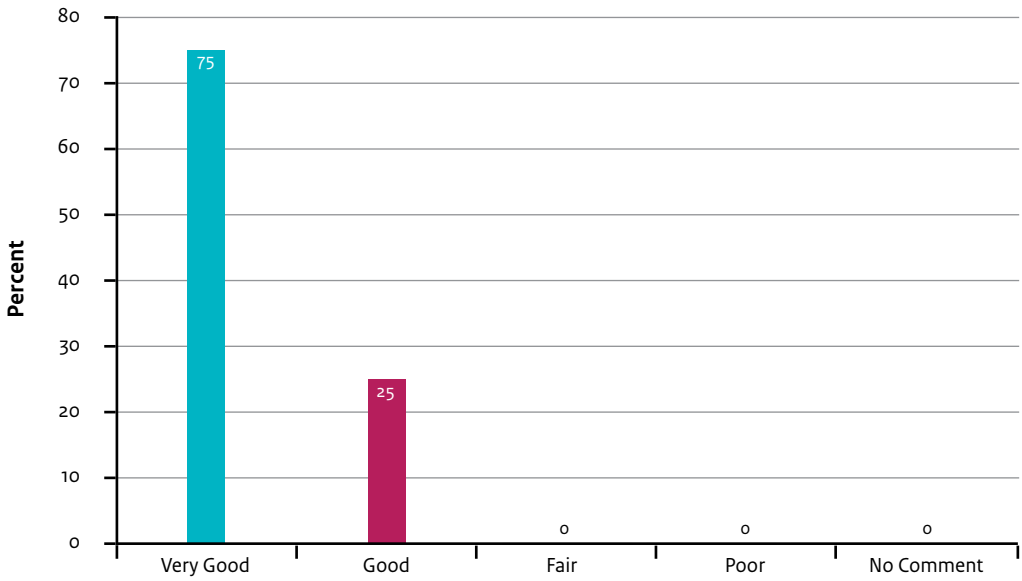

Figure 4.21: Rating of the UNESCO/GoK STEM Mentorship Programme by Students who transited to Tertiary Institutions

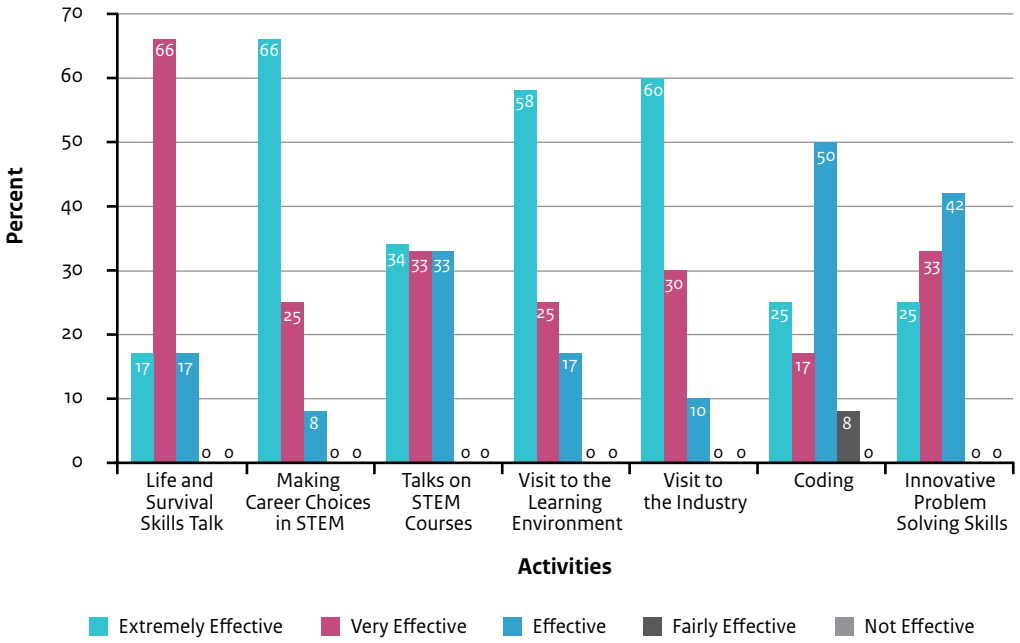

Figure 4.22: Rating of the UNESCO/GoK STEM Mentorship Programme by students who have transited to the Tertiary Institutions

Majority of the students felt that the programme was very good as shown in figure 4.21

Several activities are normally carried out during the UNESCO/GoK Mentorship programme. These are namely, life and survival skills, making career choices in STEM, Talks on STEM Programmes, visit to the learning environment and industry (work environment), coding as well as innovative problem-solving skills. The assessment sought to establish the rating of the various activities and the responses are shown in figure 4.22

The general rating for all the activities although at varying scales ranged from extremely effective to effective. The activities on making career choices in STEM, visit to the learning environment and industry getting a rating of extremely effective.

It was desirable to establish whether any of the activities in the programme had any impact on the attitudes of the students towards the STEM subjects. The results obtained are shown in figure 4.23.

Fig. 4.23 Impact on the UNESCO/GoK STEM Mentorship Programme activities on the attitudes of the students who have transited to Tertiary Institutions on the STEM subjects

Majority of the students felt that the activities did indeed have a positive impact on their attitudes towards the STEM subjects, albeit at varying scales ranging from extremely high positive impact to high positive impact.

In terms of the influence of the UNESCO/GoK STEM Mentorship Programme on the course the students are pursuing at the Tertiary institutions, the responses received are shown in figure 4.24.

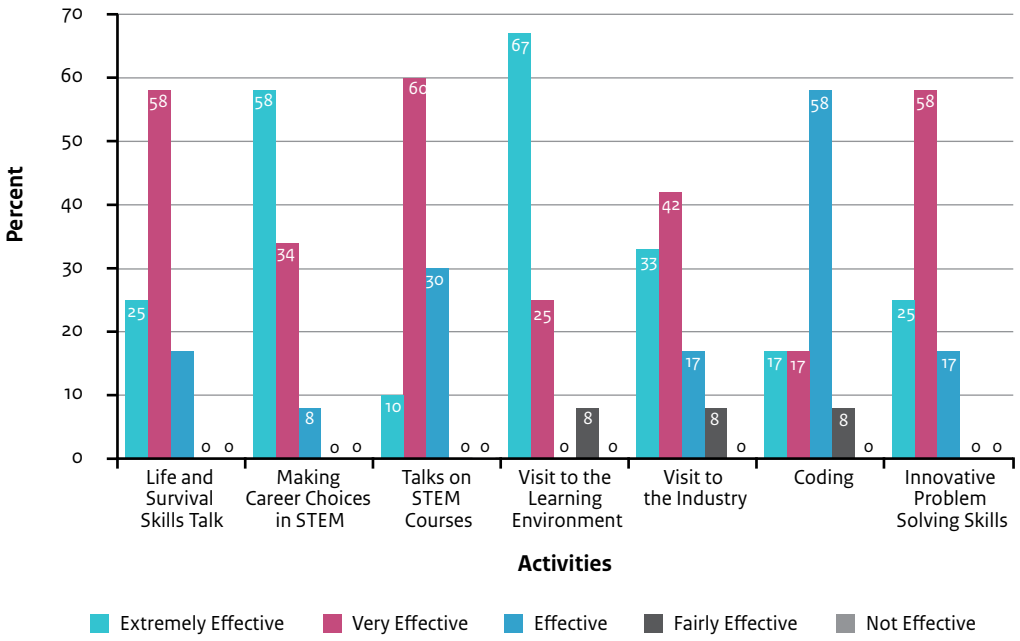

Figure 4.23: Impact on the UNESCO/GoK STEM Mentorship Programme activities on the attitudes of the students who have transited to Tertiary Institutions on the STEM subjects

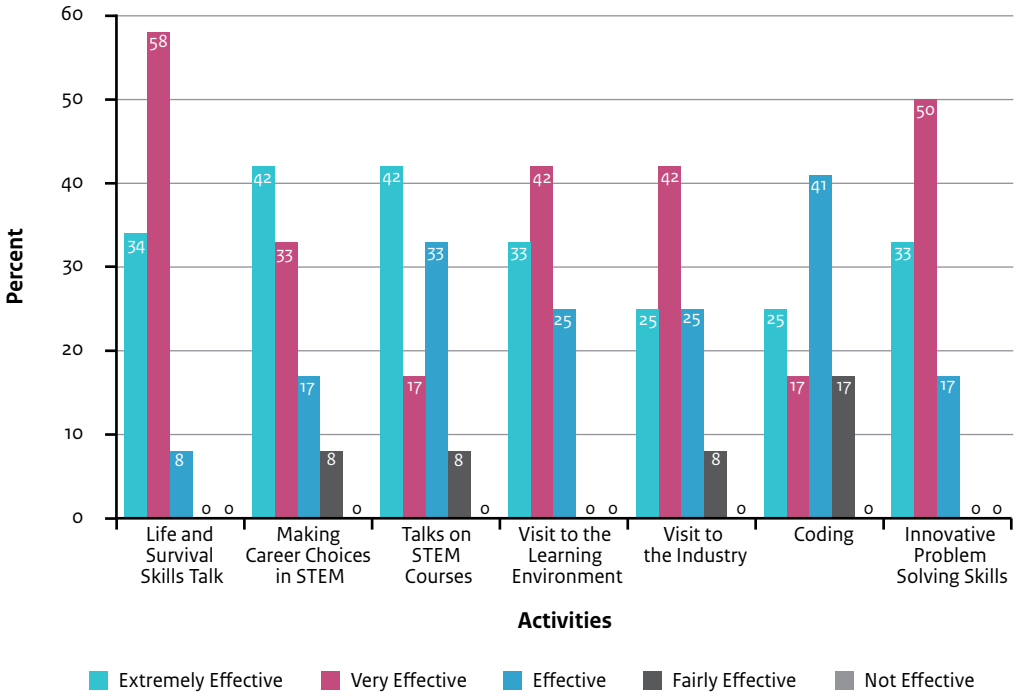

Figure 4.24: Impact of the UNESCO/GoK STEM Mentorship Programme activities on the choice of the course students are pursuing at the Tertiary Institutions.

From the responses received, there was overwhelming agreement that indeed the UNESCO/GoK STEM Mentorship Programme activities did have an impact ranging from extremely high to high on the choice of the courses the students are pursuing at the Tertiary institutions.

One of the challenges encountered at the Tertiary institutions is retention of students in the STEM career. In this regard the assessment sought to establish whether the students pursuing the STEM programmes intend to stay in the STEM career. The responses received are shown in figure 4.25

From the responses received, it was overwhelmingly in the affirmative that they would wish to continue to pursue the line in STEM as shown in figure 4.25.

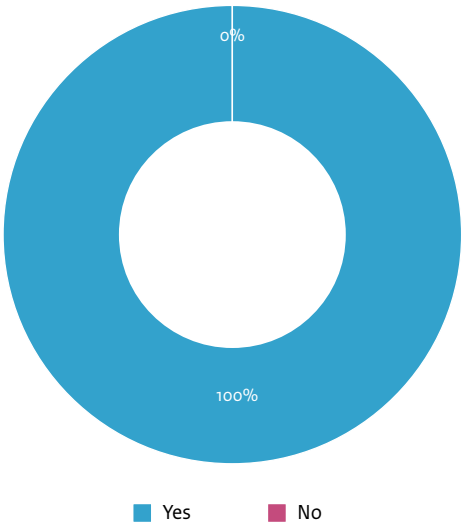

Figure 4.25: Responses on those who wish to stay in the STEM career

Finally, it was important to find out whether the students had any other views or suggestions that would help improve future UNESCO/GoK STEM Mentorship Programmes. A raft of suggestions was given as shown in box 4.1.

Box 4.1: Suggestions on the improvement of UNESCO/GoK STEM Mentorship Programme by Students who have transited to Tertiary Institutions

- Continue mentoring
- Follow-up took long – Link up together all the mentored students doing STEM so that they can mentor others in return
- Offer scholarships to the people in STEM in order to motivate them– Those that have been mentored and are pursuing STEM courses
- Increase Number of students mentored per school so that they can in turn mentor a bigger population of fellow students
- Continue with the same programme
- When nominating students to be mentored, Consider both best and poor performers
- Reach out to the extremely remote areas and also try to coach students at lower levels (primary schools) as you Continue mentoring those at high school levels
- Try to work with STEM programme beneficiaries so that it can be a proof that the mentorship is working i.e. Use those who have joined STEM career and they were mentored under STEM Mentorship Programme.

4.4 Impact of UNESCO/GoK STEM Mentorship Programme on Continuing students

4.4.1 Continuing Students' Profile

For the students still in school, the profile focussed on the county, the Form (level), STEM subjects the student is taking, target grade and the mean score in the last examination.

Figure 4.26 shows the profile of the students by county.

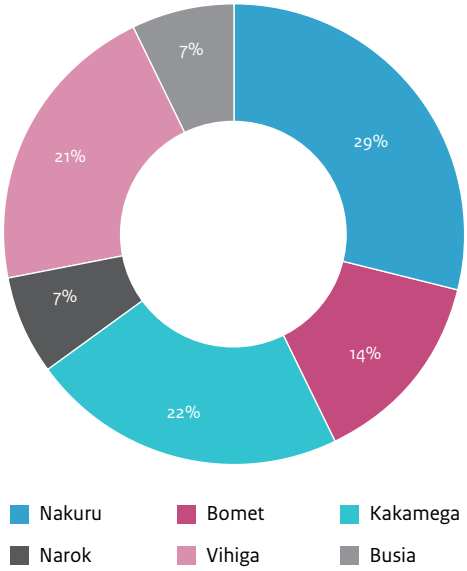

Figure 4.26: Profile of Continuing Students by County

The continuing students who participated in the survey came from different counties as shown in figure 4.26. Nakuru had the highest with 29%, followed by Kakamega at 22%, Vihiga 21%, Bomet 14% with Busia and Narok at 7% each.

In terms of the student level or form, the results are shown in figure 4.27.

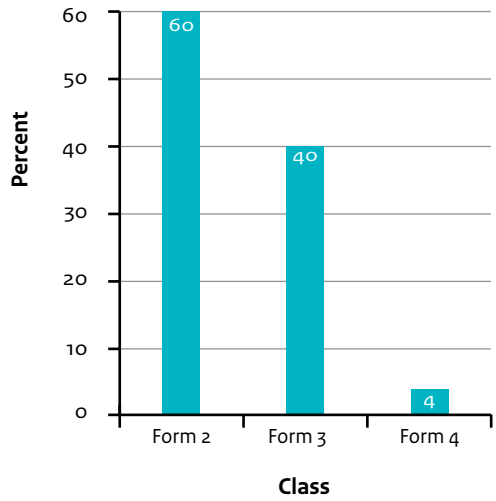

Figure 4.27: Profile of Continuing Students by Form

It is evident that majority of the students who participated in the survey were in form 2 followed by form 3 with form 4 having the least representation.

The assessment sought to establish the STEM subjects the students were undertaking and the results are shown in figure 4.28

From figure 4.28, the continuing students are pursuing subjects with majority taking all sciences followed by Chemistry/Biology, Computer Studies then Physics and Chemistry.

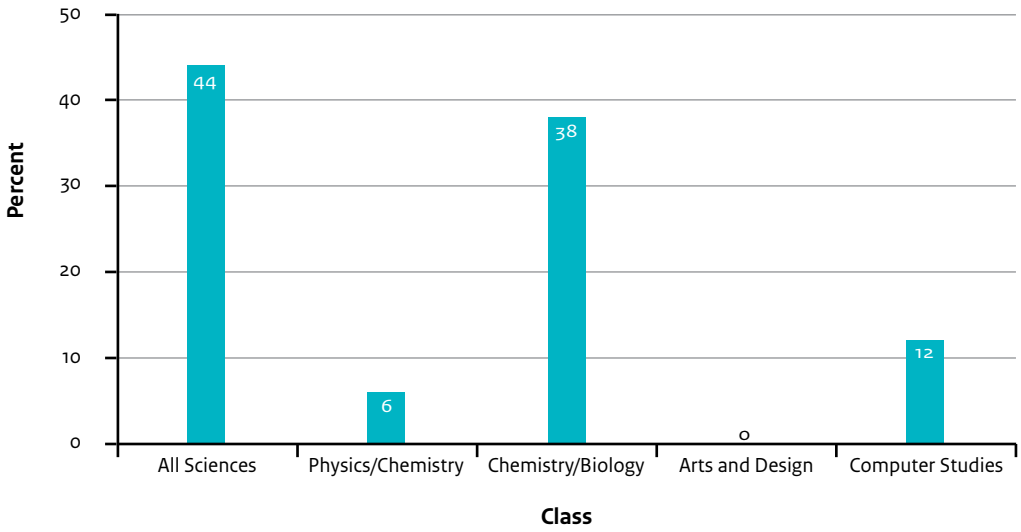

Figure 4.28: Profile of Continuing Students by STEM Subjects

In terms of the students' target grade, the responses received are shown in figure 4.29.

Majority of the students had a target grade of B+ followed by A- with A and B having the same weight as shown in figure 4.29

In order to gauge the students' academic performance, the assessment sought to establish the mean grade attained in the last examination and the responses received are shown in figure 4.30

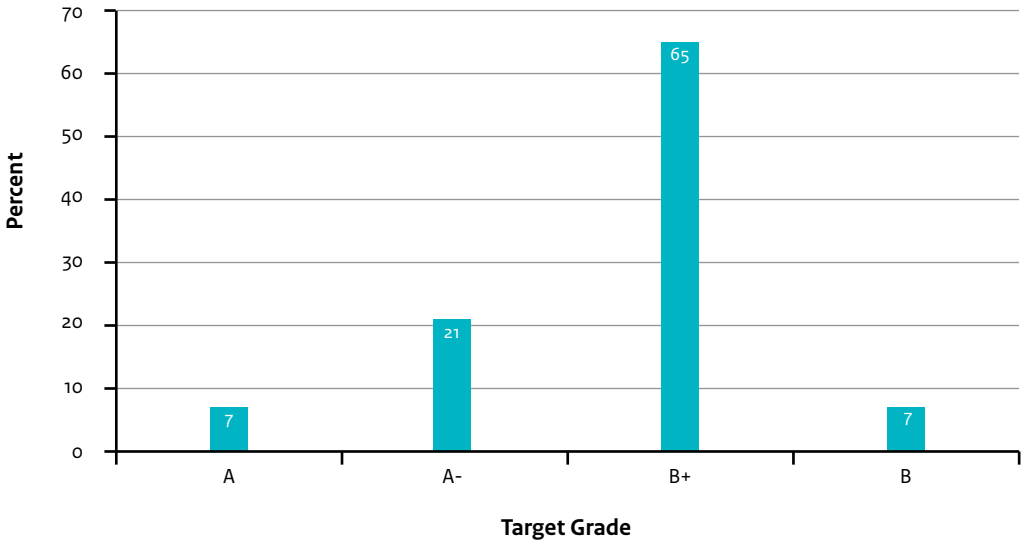

Figure 4.29: Profile of Continuing Students by Target Grade

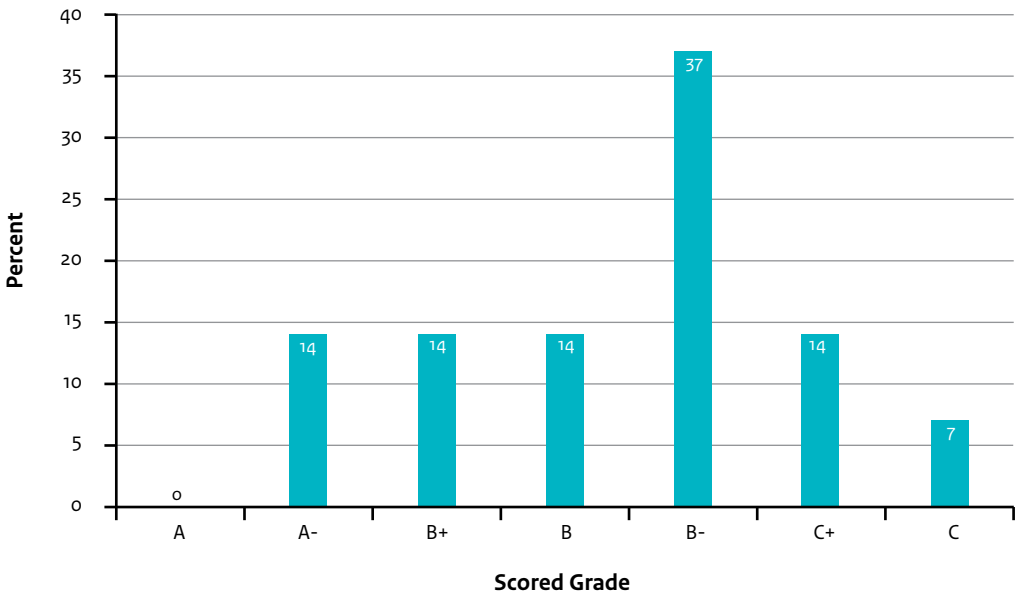

Figure 4.30: Profile of Continuing Students by mean grade attained in the last examination

Majority of the students attained a mean grade of B-, with A-, B+, B and C+ having the same percentage followed by C and no student scored an A as shown in figure 4.30.

4.4.2 Perception of UNESCO/GoK STEM Mentorship Programme Through The Continuing Students' Lens

The perception of the UNESCO/GoK STEM programme through the continuing students' lens was done by establishing whether they participated in the programme, rating of the programme, impact on the attitude towards STEM subjects, performance in the STEM and subsequently the influence on the choice of the course to pursue at the tertiary institution. In addition, it was also important to establish where they intend to pursue a STEM career and if so which career. Finally, suggestions on improvement for future UNESCO/GoK STEM Mentorship Programme were also sought.

The percentage of continuing students who participated in the UNESCO/GoK STEM Mentorship Programme is shown in figure 4.31

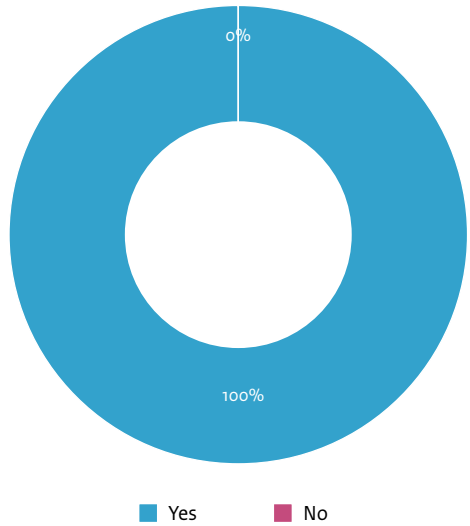

Figure 4.31: Continuing students who participated in the UNESCO/GoK STEM Mentorship Programme

From the responses received, overwhelmingly 100% participated in the UNESCO/GoK STEM Mentorship Programme as shown in figure 4.31

In terms of general rating of the programme, the results obtained are shown in figure 4.32

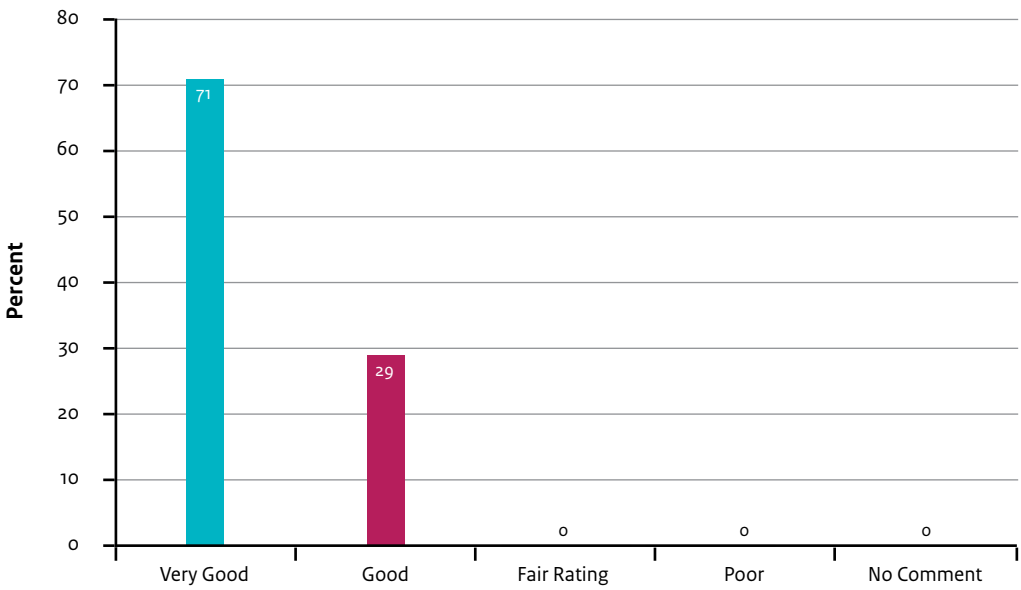

Figure 4.32: Rating of the UNESCO/GoK STEM Mentorship Programme

The rating of the UNESCO/GoK STEM Mentorship Programme was generally very good at 70% with the rest rating it as good at 30% as shown in figure 4.32

The assessment also sought to establish the general rating of the UNESCO/GoK STEM Mentorship Programme activities on the continuing students. The responses received were analysed and the results are presented in figure 4.33.

The continuing students generally felt that the UNESCO/GoK STEM Mentorship Programme activities namely life and survival skills talk; making career choices in STEM; talks on STEM programmes; visit to the Learning Environment; visit to the Industry; Coding and Innovative Problem Solving Skills ranged from extremely effective to effective as shown in figure 4.33.

In terms of the impact of the UNESCO/GoK STEM Mentorship Programme activities on the attitude towards STEM subjects on the continuing students. The responses received were analysed and the results are presented in figure 4.34.

The continuing students generally felt that the UNESCO/GoK STEM Mentorship Programme activities namely, life and survival skills talk; making career choices in STEM; talks on STEM courses; visit to the Learning Environment; visit to the Industry (work environment); Coding and Innovative Problem Solving Skills

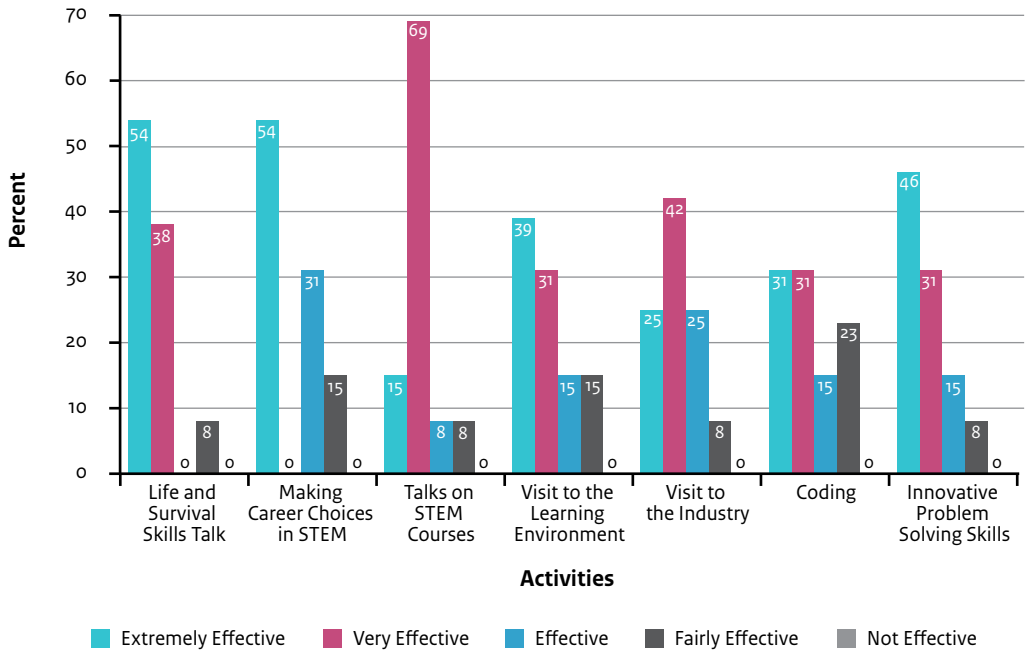

Figure 4.33: General rating of the UNESCO/GoK STEM Mentorship Programme activities by the Continuing Students

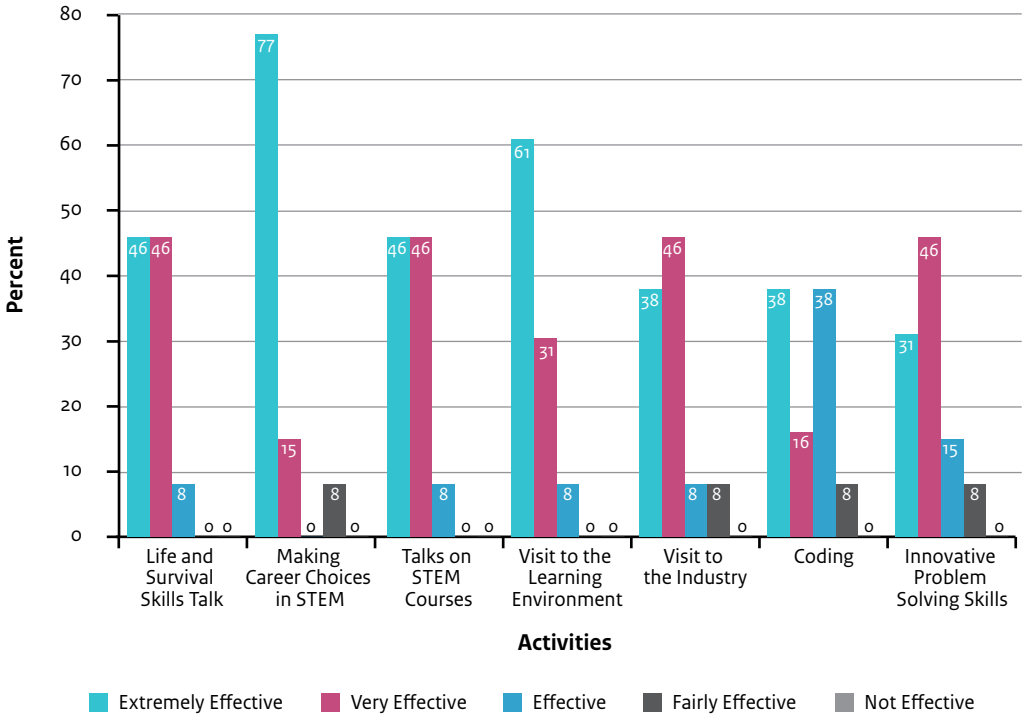

Figure 4.34: Impact of the UNESCO/GoK STEM Mentorship Programme activities on the attitude towards STEM subject by the Continuing Students

had an extremely high positive impact to high positive impact on the attitude towards STEM subjects as shown in figure 4.34.

In addition, it was important to establish whether the UNESCO/GoK STEM Mentorship Programme activities had any impact on the subsequent performance in the STEM subjects of the continuing students. The responses received are shown in figure 4.35.

The continuing students confirmed that indeed the UNESCO/GoK STEM Mentorship Programme did have an impact on their subsequent performance in the STEM subjects. The impact ranged from extremely high performance to high performance as depicted in figure 4.35.

In terms of whether the UNESCO/GoK STEM Mentorship Programme activities will influence the choice of the programme/course to pursue at the University, the responses received were analysed and the results shown in figure 4.36.

The continuing students felt that the UNESCO/GoK STEM Mentorship Programme activities will indeed have an influence on the choice of the course they will pursue at the University as shown in figure 4.36. The general rating ranged from extremely high influence to high influence.

The assessment also sought to establish whether the continuing students intend to pursue a STEM based career and the results obtained are shown in figure 4.37.

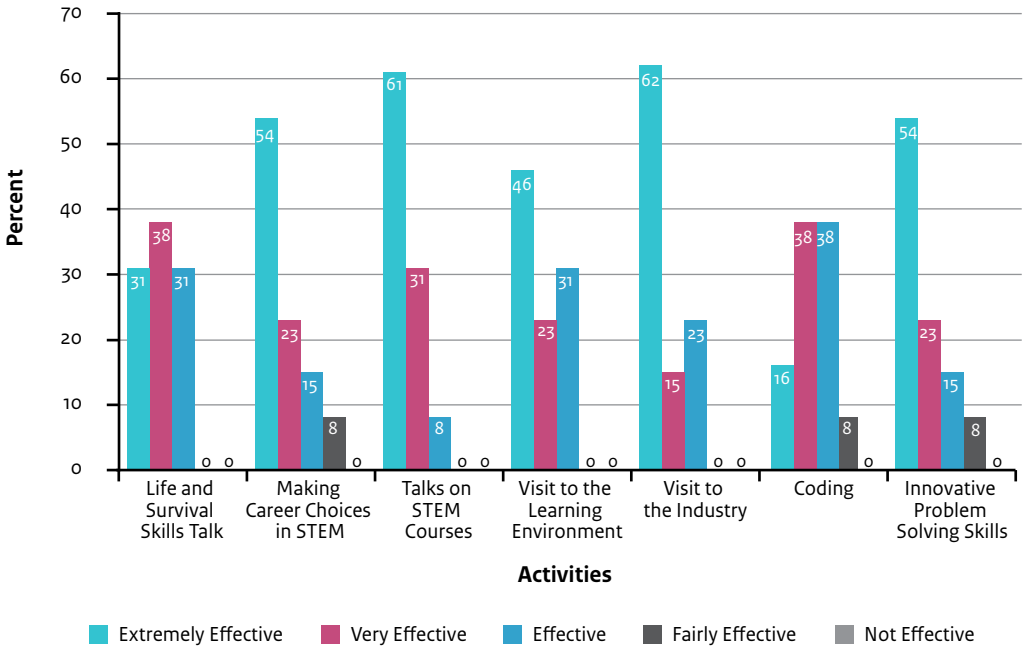

Figure 4.35: Impact on Performance of STEM subjects by the UNESCO/GoK STEM Mentorship Programme

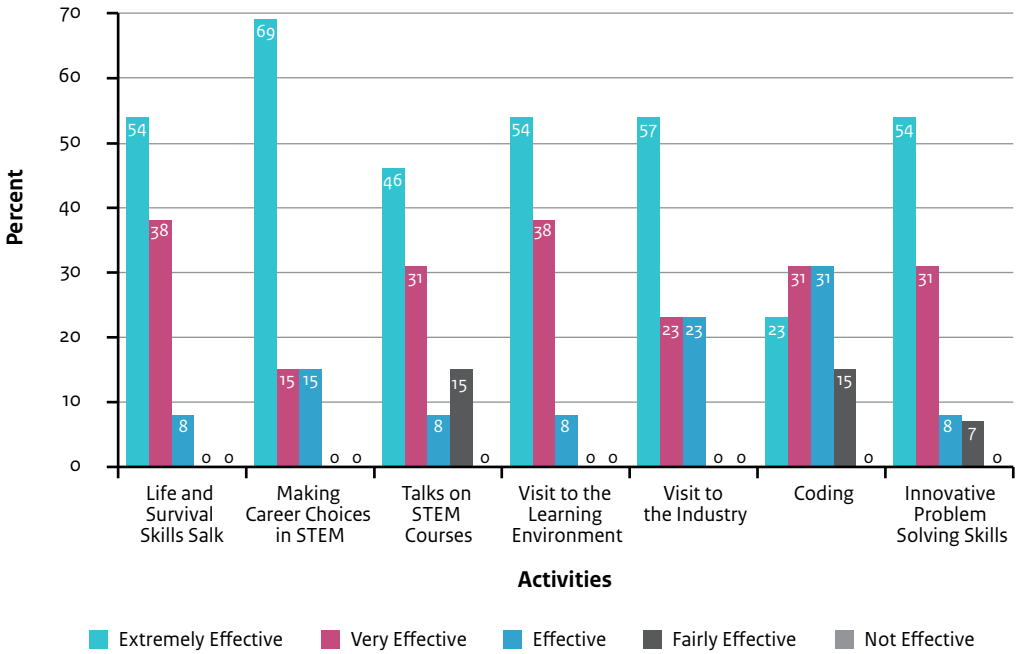

Figure. 4.36: Influence of the UNESCO/GoK STEM Mentorship Programme activities on choice of the programme/course to pursue at the University

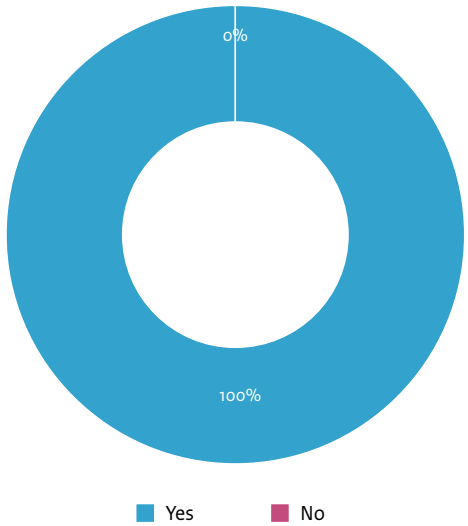

Figure 4.37: Continuing Students interested in pursuing a STEM-based career

The continuing students overwhelmingly stated that they would wish to pursue a STEM based career as shown in figure 4.37.

The assessment further sought to establish which STEM based career the continuing students would wish to pursue, and the results are shown in figure 4.38

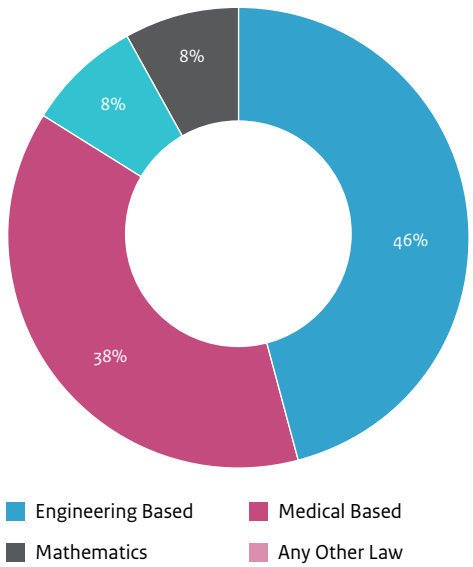

Figure 4.38: STEM based Career continuing students would wish to pursue

It is evident that majority of the continuing students would wish to pursue Engineering based careers at 46%, followed by medical based at 38% with mathematics and any other having an equal weight of 8% as shown in figure 4.38.

Finally, it was important to find out whether the continuing students had any suggestions that would help improve future UNESCO/GoK STEM Mentorship Programmes. Several suggestions were given as shown in box 4.2.

Box 4.2: Suggestions on the improvement of UNESCO/GoK STEM Mentorship Programmes by Continuing Students

- Continue mentoring more students to change their attitude;
- Improve facilities in schools to enhance their talents;
- Innovations to be encouraged - maybe they can come up with some programmes that can support innovative ideas for example science congress;
- Put more emphasis on making career choices and career guidance;
- When nominating participants in the STEM programme, both best performers and those that are not should be considered;
- Support schools to have instruments for experiments and more STEM teachers where possible;
- Visit different schools;
- Initiate STEM activities/projects in schools which encourage the students to perform well in STEM;
- Robotics should be included in the curriculum early enough;
- Offer scholarships to best performers in STEM subjects, especially to study abroad as this will be a great motivation to the student
- Support with equipment for Inventions/ innovations projects to give real results.

4.5 Impact of UNESCO/GoK STEM Mentorship Programme on Teachers of STEM subjects

4.5.1 Teachers' Profile

The assessment of the STEM teacher's profile focussed on the distribution of teachers by county, form, subjects taught, and the average mean grade obtained in the previous year.

The teacher's responses by county are shown in figure 4.39.

In terms of the forms taught, the responses received were analysed and the results shown in figure 4.40.

From the figure 4.40, majority teach form 4, followed by form 2 with form 1 and 3 having equal weights.

On the subjects taught, the results are shown in figure 4.41.

Majority of the teachers who participated in the STEM camp teach STEM subjects as shown in figure 4.41, with the highest number in Chemistry/Biology followed by Maths/ Physics.

In terms of the average mean grade obtained in the STEM subjects taught in the previous year, the responses received were analysed and the results presented in figure 4.42.

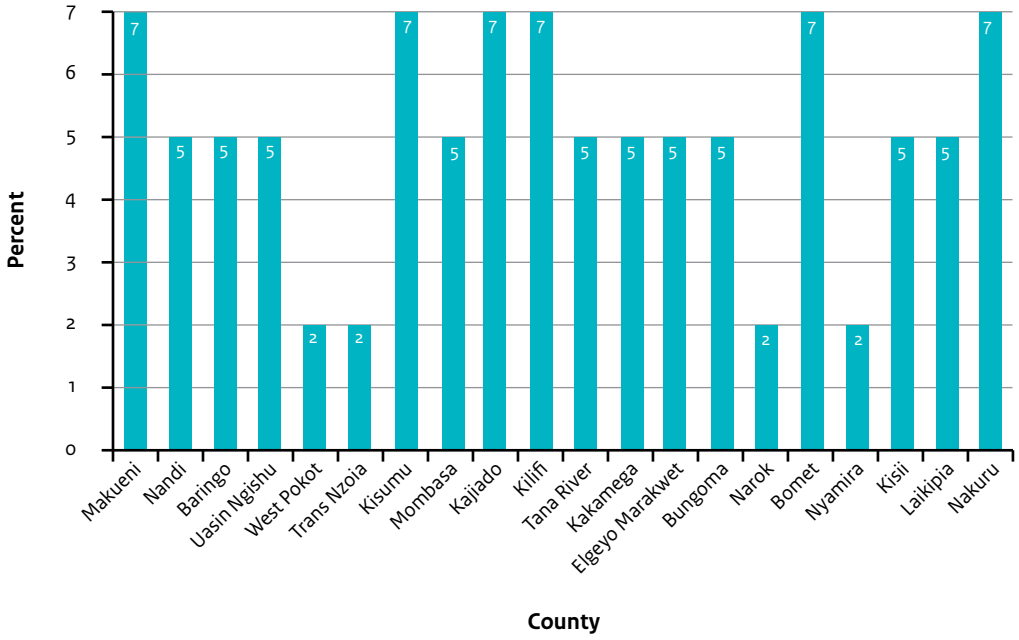

Figure 4.39: Profile of teachers by County

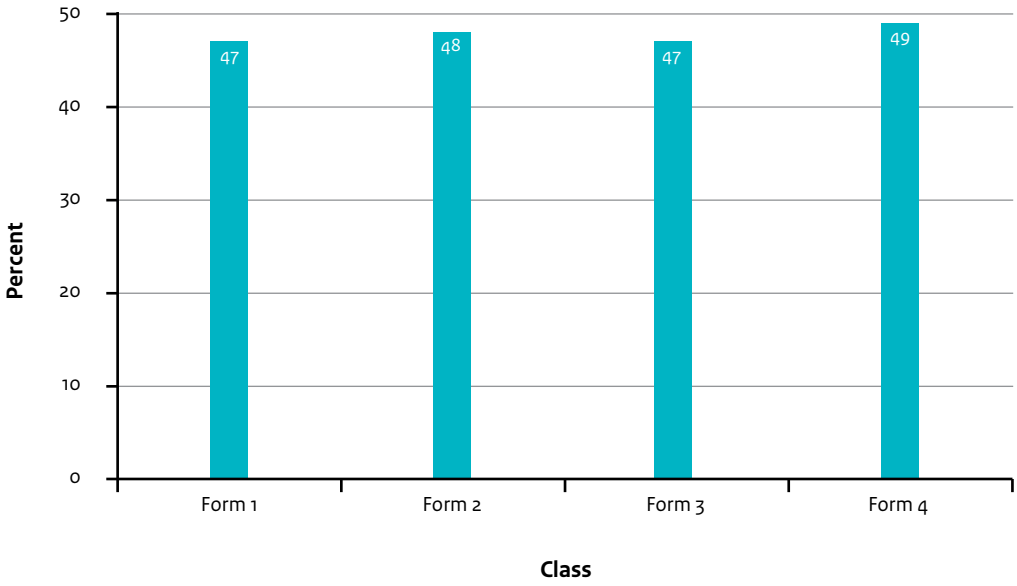

Figure 4.40: Profile of STEM Teachers by the Forms Taught

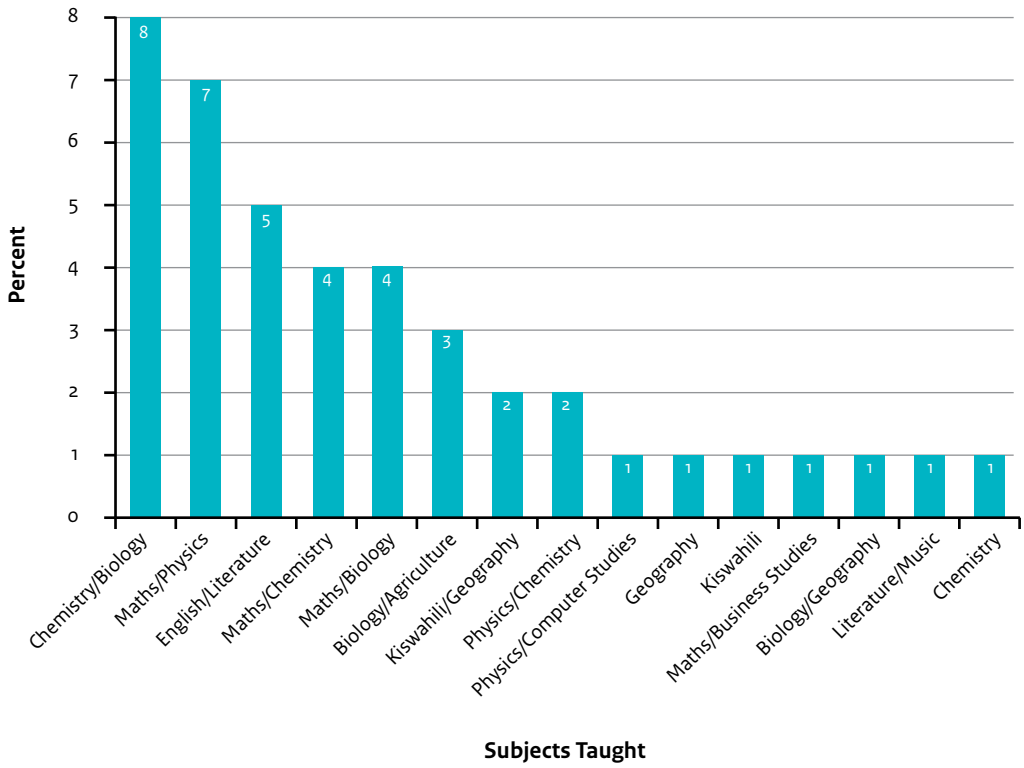

Figure 4.41: Profile of STEM teachers by Subjects Taught

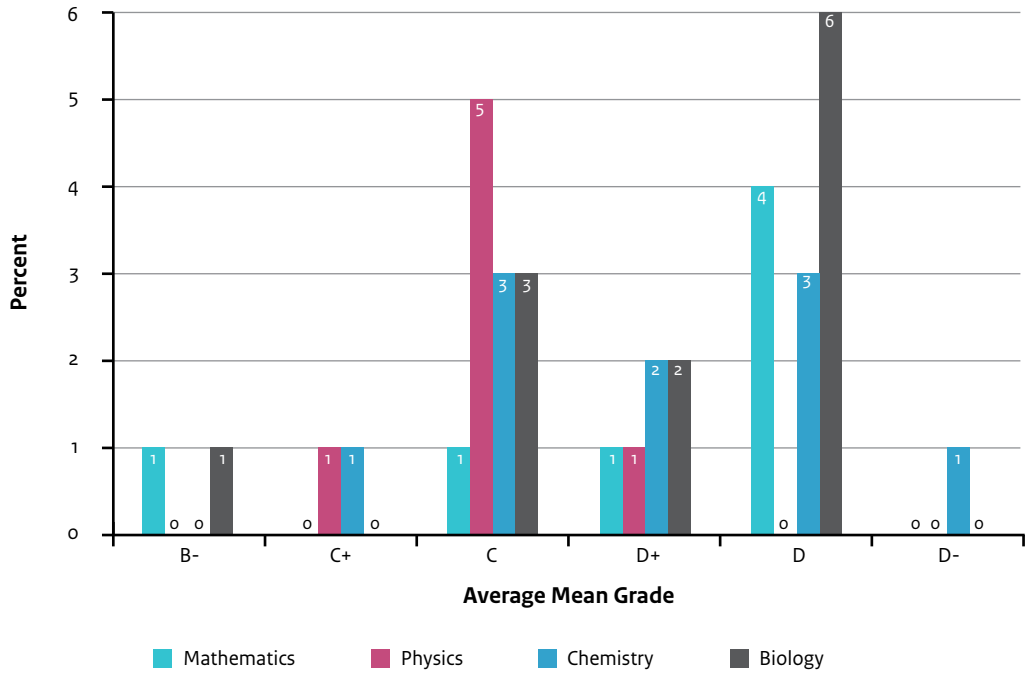

Figure 4.42: Profile of STEM teachers by the Average mean grade in the STEM subjects in the previous year

For the teachers who participated in the survey, it is evident that the performance in the STEM subjects is generally average based on the grades in the previous year as shown in figure 4.42. Mathematics seems to be the best subject followed by Biology.

4.5.2 Perception of UNESCO/GoK STEM Activities Through the Teachers' Lens

The perception of the UNESCO/GoK STEM programme through the teachers' lens was done by establishing whether the teacher participated, the year of participation, rating of the programme and activities, impact of each of the STEM activities on the attitude and skills of teaching STEM subjects, impact of each of the STEM activities on the subsequent performance of the students in STEM subjects; rating of the Teacher Mentorship Programme on STEM pedagogy in terms of relevance; impact the Teacher Mentorship Programme on gender responsive STEM pedagogy had on his/her approach to the teaching of STEM subjects; the average mean grade after the STEM programme in the subject. Further any suggestions that would lead to the improvement of future UNESCO/ GoK STEM Mentorship Programme.

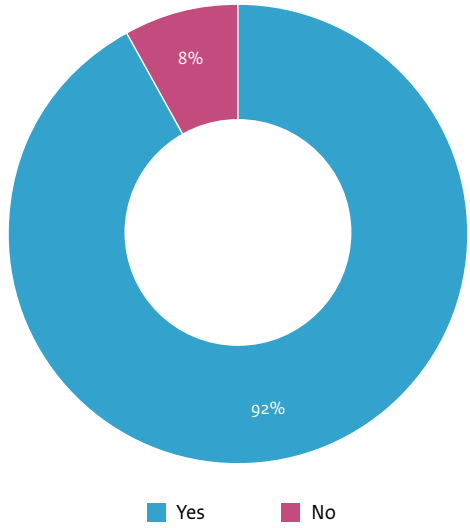

Figure 4.43: Teachers participation in the UNESCO/GoK STEM Mentorship Programme

In terms of the participation in the UNESCO/GoK STEM Mentorship Programme, the responses received after analyses are shown in figure 4.43.

A total of 92% teachers who participated in the survey confirmed to have taken part in the UNESCO/GoK STEM Mentorship Programme as shown in figure 4.43.

In terms of the year of participation in the UNESCO/GoK STEM Mentorship Programme, the results are shown in figure 4.44.

From the survey, majority at 33% reported to have participated in the UNESCO/GoK STEM Mentorship Programme in 2015 followed by 25% in 2016, 19% in 2019, 17% in 2014 and 6% in 2018 as shown in figure 4.44.

It was important to establish the general rating of the UNESCO/GoK STEM Mentorship Programme by the STEM Teachers. The results obtained are presented in figure 4.45.

From the figure 4.45, there was a general view by the teachers that the UNESCO/GoK STEM Mentorship Programme is very good.

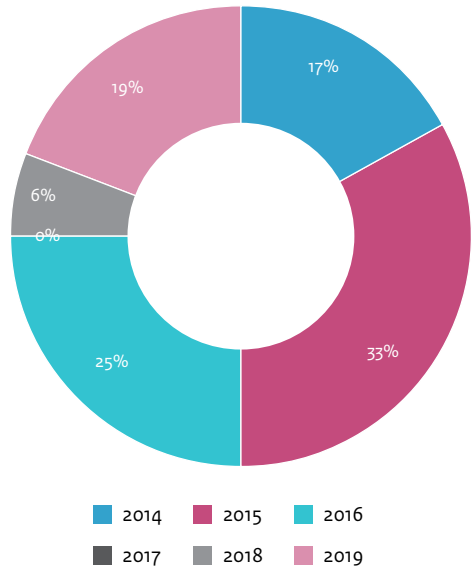

Figure 4.44: Year of participation by the Teachers in the UNESCO/GoK STEM Mentorship Programme

In terms of the UNESCO/GoK STEM Mentorship Programme activities, the results after evaluation are shown in figure 4.46.

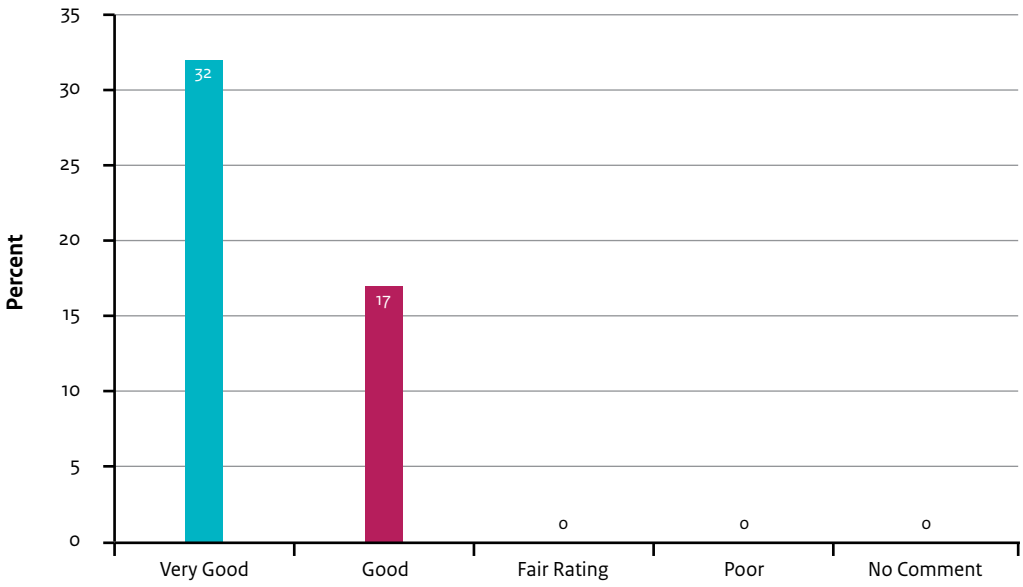

Figure 4.45: Rating of the UNESCO/GoK STEM Mentorship Programme by STEM Teachers

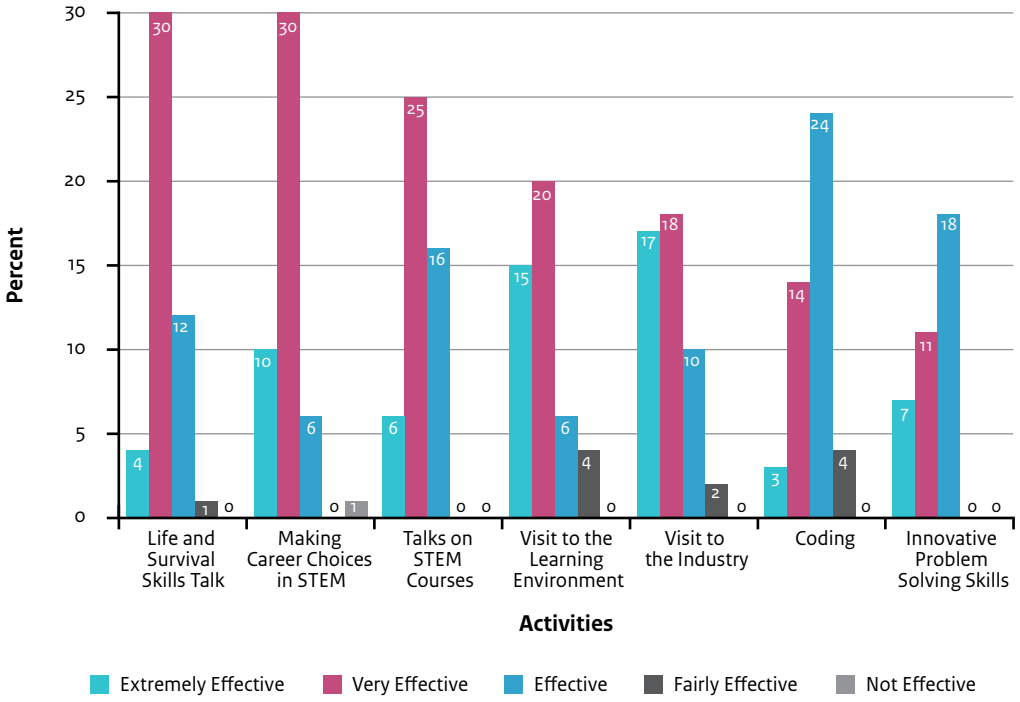

Figure 4.46: Rating of the UNESCO/GoK STEM Mentorship Programme activities by STEM Teachers

The general rating of the UNESCO/GoK STEM Mentorship Programme activities ranged from extremely effective to effective as shown in figure 4.46.

It was also important to establish the impact of each of the UNESCO/GoK STEM Mentorship Programme activities on the attitude and skills of teaching STEM subjects. The results obtained are presented in figure 4.47.

The analysis revealed that the UNESCO/GoK STEM activities had positive impact with regards to the attitude and skills of teaching STEM subjects as shown in figure 4.47. The impact ranged from extremely positive to fairly high positive.

In terms of performance of students in teachers STEM subjects, the responses received were analysed and results are presented in figure 4.48.

It is evident that the UNESCO/GoK STEM Mentorship Programme activities had an extremely positive impact on the students' performance in the STEM subjects taught by the teachers as shown in figure 4.48.

The Teachers were taken through a sensitization programme on gender responsive STEM pedagogy. In this regard the assessment sought to establish the relevance of this undertaking. The responses received were analysed and the results presented in figure 4.49.

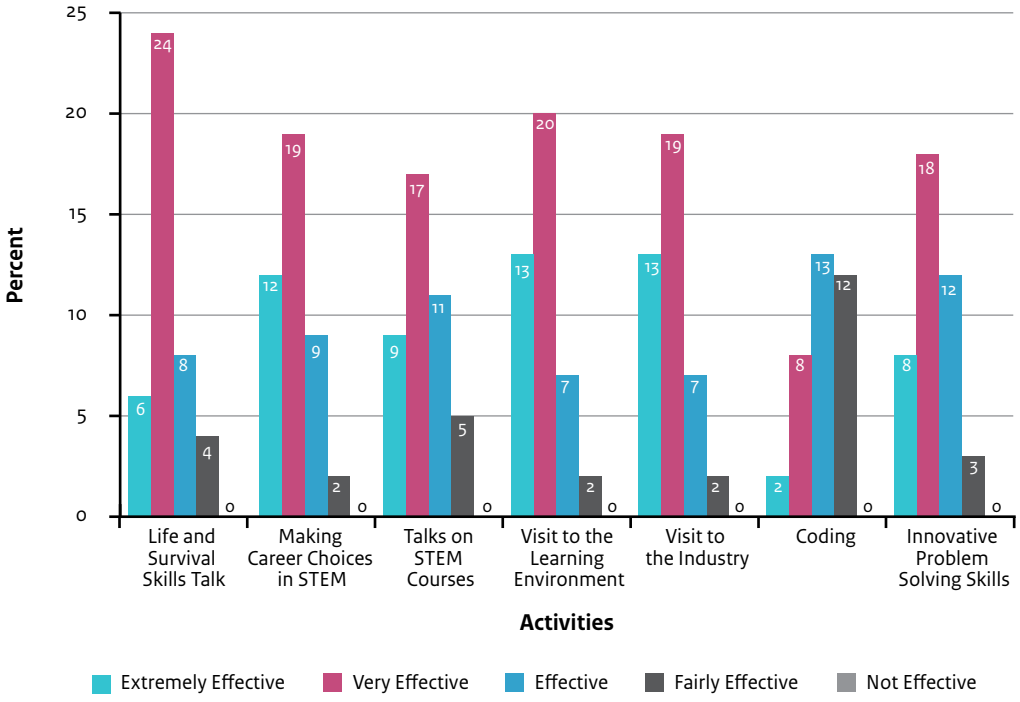

Figure 4.47: Impact on the attitude and skills of teaching STEM subjects

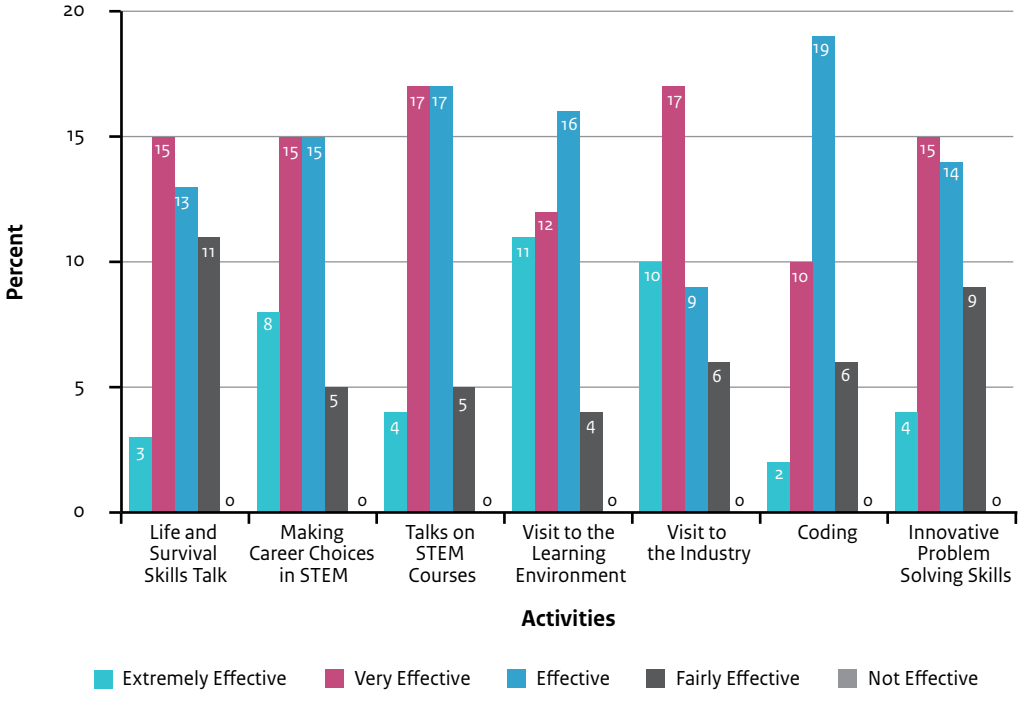

Figure 4.48: Performance of students in teacher's STEM subjects

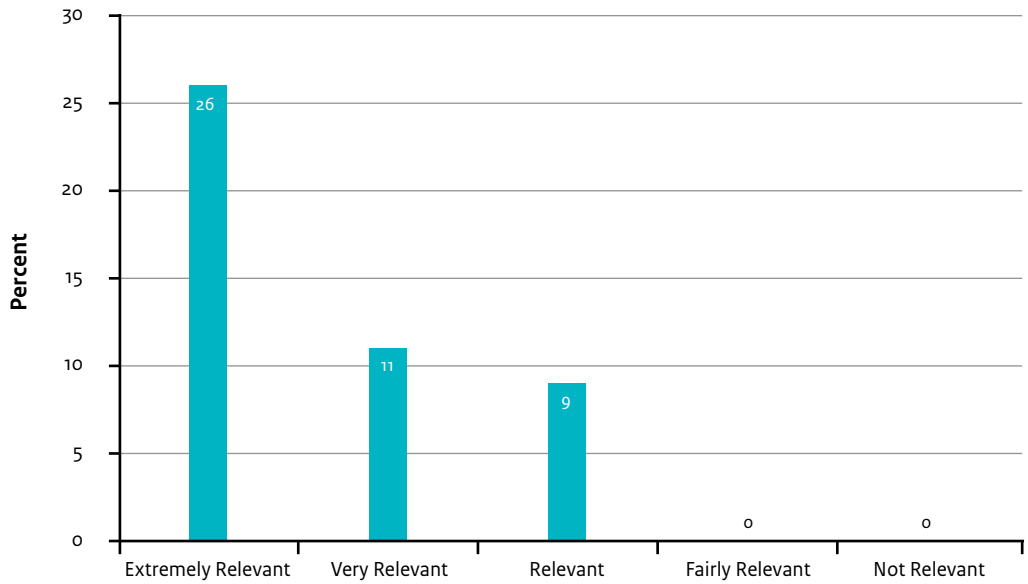

Figure 4.49: Relevance of Gender Responsive STEM pedagogy Sensitization

The STEM teachers were generally of the view that the gender responsive STEM pedagogy sensitization was extremely relevant as depicted in figure 4.49.

In terms of the impact the Teacher sensitization Programme on gender responsive STEM pedagogy had on the approach taken by teachers of STEM subjects, an assessment was done and the results are shown in figure 4.50.

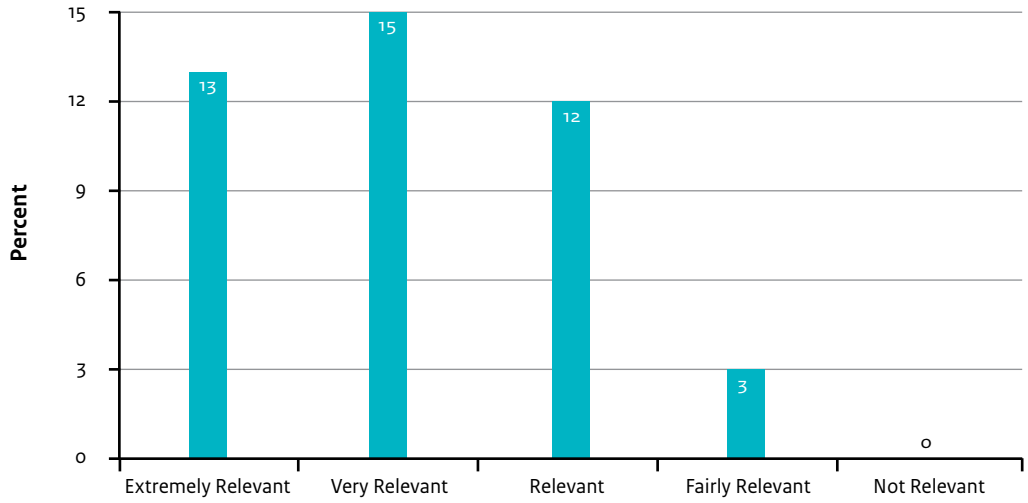

Figure 4.50: Impact of the Teacher Sensitization Programme on STEM pedagogy on the approach taken by STEM Teachers

After evaluating the responses, the results revealed that the impact of the Teacher Sensitization Programme on gender responsive STEM pedagogy with regard to the approach taken by STEM teachers generally ranged from extremely positive to high positive impact as shown in figure 4.50.

In order to establish whether the UNESCO/GoK STEM Mentorship Programme had an impact on the students' performance, an assessment was done, and the results are shown in figure 4.51.

There is a marked improvement in terms of students' performance in general as shown in figure 4.51. Before the UNESCO/GoK STEM Mentorship camp, there were few students with a score of B majority had a score of C and D as shown in figure 4.42

From a STEM teacher's perspective, it was important to establish whether they had any suggestions that would help improve future UNESCO/GoK STEM Mentorship Programmes. Several suggestions were given as shown in box 4.3.

Box 4.3: Suggestions on the improvement of UNESCO/GoK STEM Mentorship Programmes by STEM Teachers

- To have a programme whereby each cohort has the programme separately - that is, each form separately;
- Regular programmes should be organized to increase the impact: The programme had a great impact and both students and teachers wish for more;
- Instead of focusing on students alone, have some programme for the teachers and involve teachers fully. Having 2 students out of a population of 600 students and nothing for the teachers means that the impact is not much and may not be felt;
- Gender responsive Pedagogy session for teachers – only few teachers were involved. More teachers should be involved;
- Decentralize the STEM programme;
- Resources/Facilities are inadequate in most schools; STEM to see how they can assist on these;
- Include Robotics activities because it caters for physics;
- Allocate more time to coding.

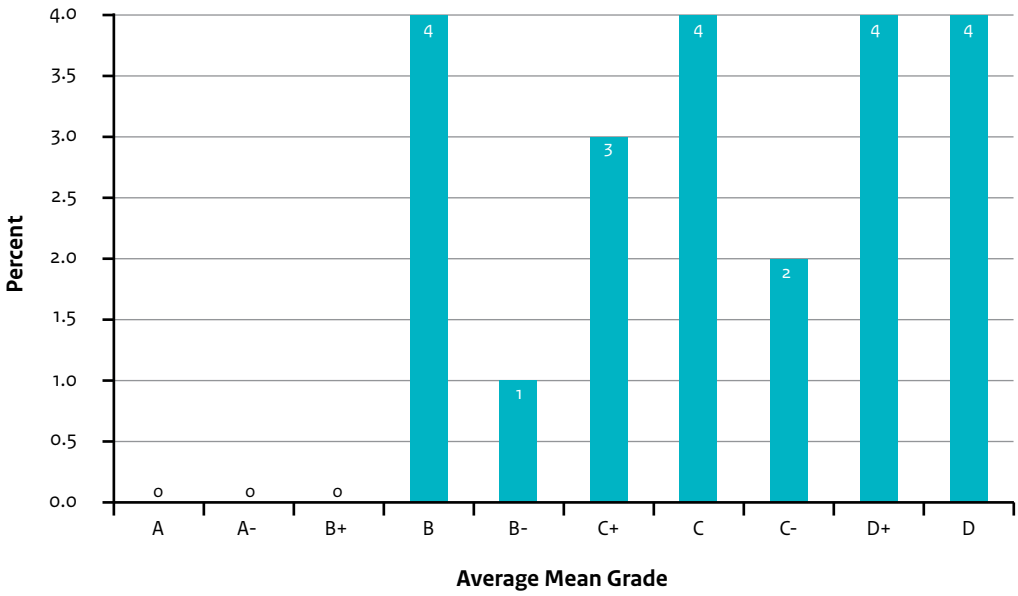

Figure 4.51: General Performance after the UNESCO/GoK STEM Mentorship Programme

4.6 Perception of Head Teachers on the UNESCO/GoK STEM Mentorship Programme

4.6.1 Head Teacher's School Profile

The assessment of the Head teacher's school profile focussed on the county, school category, type, gender, general performance of the school in STEM subjects, performance before the UNESCO STEM mentorship camp.

The distribution of the responses received from the Head Teachers by county is shown in figure 4.52.

From the responses received, Kajiado and Bungoma Counties had the highest number of Head Teachers, followed by Nandi, West Pokot, Kakamega and Bomet as shown in figure 4.52.

Figure 4.53 shows the category of schools from the responses.

From the responses, majority of the schools that participated were extra county at 50%, followed by national and county at 19% and 12% Sub-County as presented in figure 4.53.

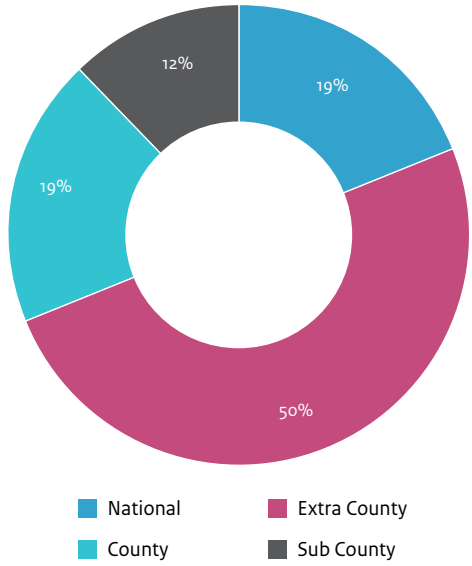

Figure 4.53: Profile of Head Teachers by Category of Schools

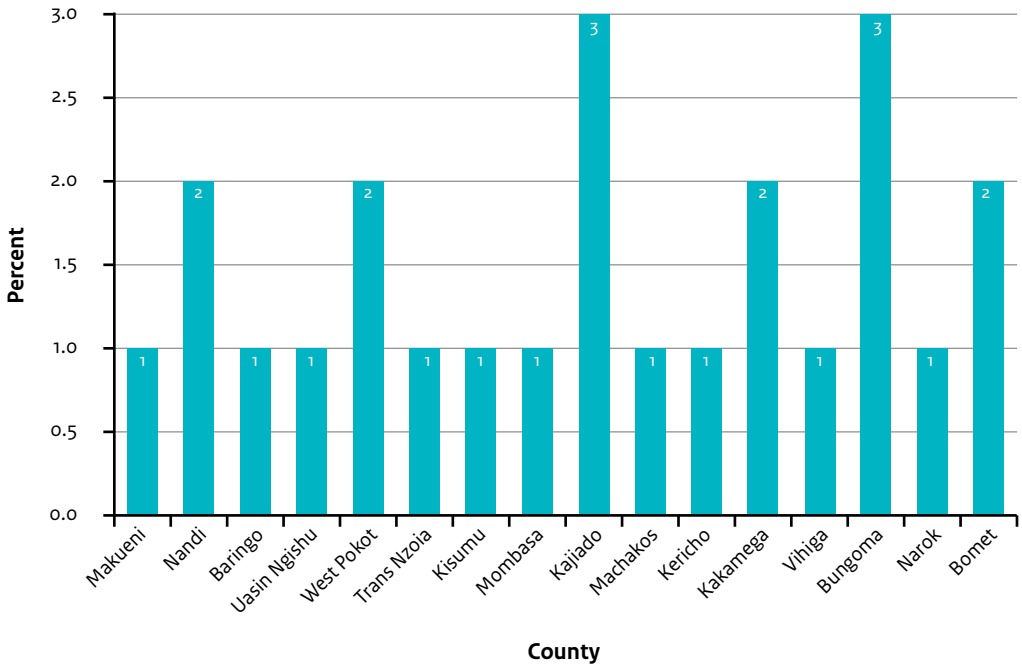

Figure 4.52: Profile of Head Teachers by County

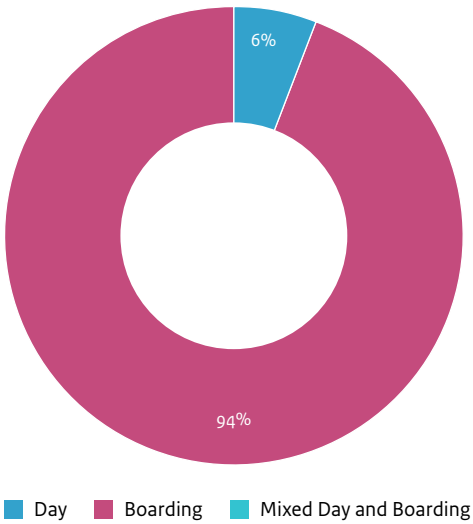

Figure 4.54: Profile of Head Teachers by classification of School by Type

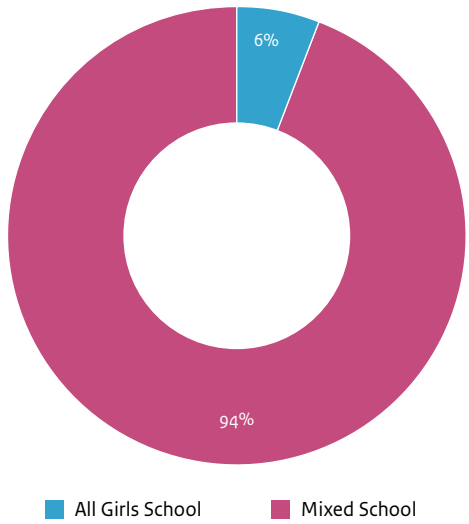

Figure 4.55: Profile of Head Teachers by classification of School type based on Gender

The parameters used to classify the type of school were day, boarding or both. Figure 4.54 shows the responses received.

From the responses received most of the schools are boarding at 94% with only 6% being day schools as shown in figure 4.54.

In terms of the gender classification namely all girls or mixed, the responses received are illustrated in figure 4.55.

From the responses received most of the schools are all girls at 94% and 6% being mixed school as shown in figure 4.55.

In order to have a baseline for assessment, it was important to establish in general the performance of the students in STEM subjects. The results obtained are shown in figure 4.56.

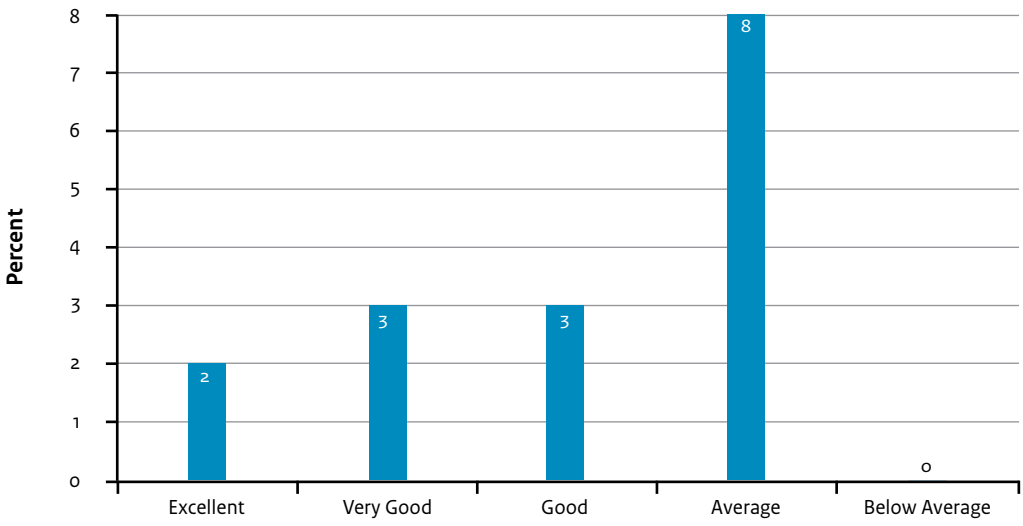

Figure 4.56: Profile of Head teachers by the general performance of students in the STEM subjects

It is evident from figure 4.56 that on average the general performance for most of the schools was average.

In addition to the general average performance in STEM subjects, the assessment sought to establish the performance before the UNESCO/GoK STEM Mentorship Programme of the main STEM subjects namely Mathematics, Physics, Chemistry and Biology. The results are shown in figure 4.57.

From the responses received, it demonstrates that performance in STEM subjects is generally poor with the best performance reported being mathematics at B+ as shown in figure 4.57

4.6.2 Perception of UNESCO/GoK STEM Activities Through The Head Teachers' Lens

The perception of the UNESCO/GoK STEM programme through the head teachers' lens was done by establishing whether the school participated, the year of participation, rating of the programme, effectiveness of the programme on the student performance and school, impact on the attitude of students and teachers, performance of the students in STEM subjects as well as the average mean grade after the mentorship programme.

From the onset it was important to establish the schools that participated in the UNESCO/GoK STEM Mentorship Programme. Figure 4.58 shows the responses obtained.

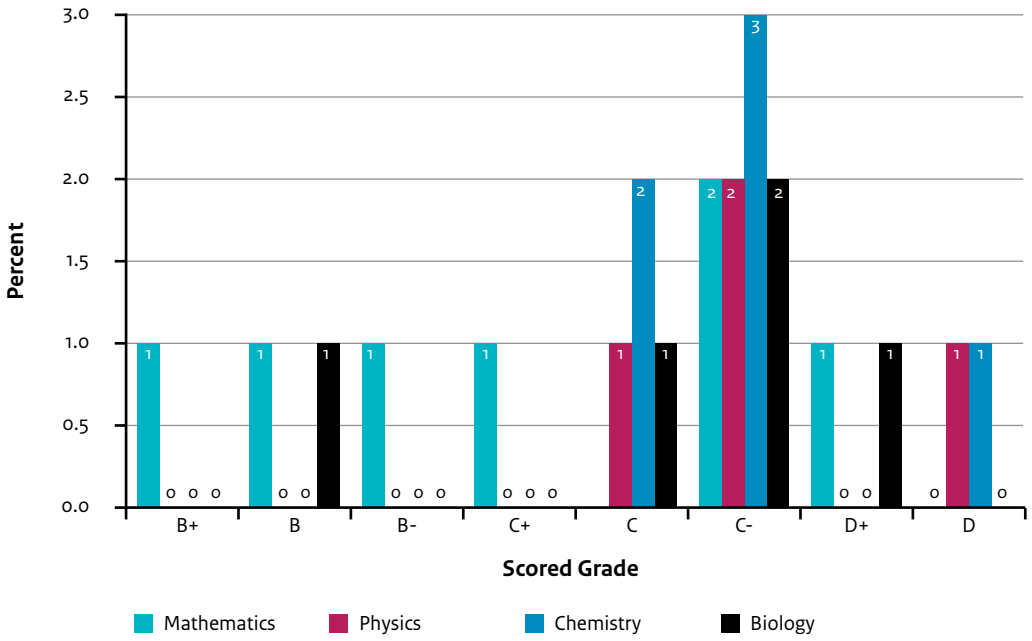

Figure 4.57: Profile of Head Teachers by the Student performance in STEM subjects before the UNESCO/GoK STEM Mentorship Programme

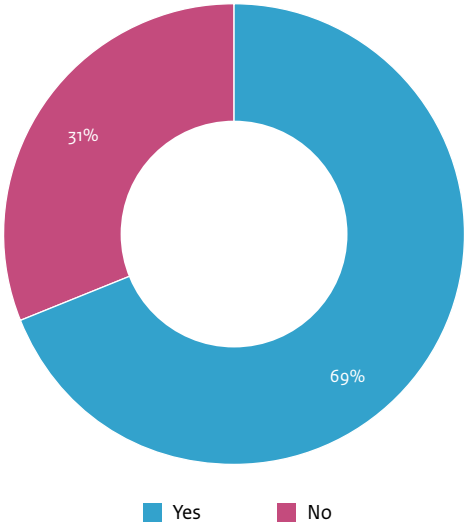

Figure 4.58: Schools that participated in the UNESCO/GoK STEM Mentorship Programme

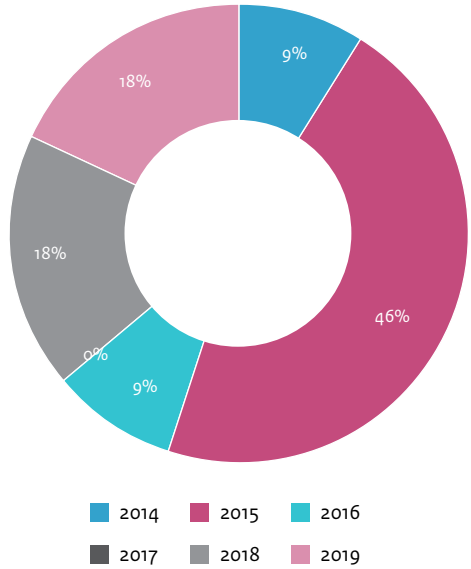

Figure 4.59: Year of UNESCO/GoK STEM Mentorship Programme participation

Figure 4.58 shows that 69% of those interviewed confirmed that their schools participated in the programme with 31% indicating that they did not. The schools that did not participate had been invited but due to varied reasons did not attend. The assessment therefore focussed on the schools that participated.

For the schools that participated in the programme, it was important to establish the year of participation. The results are shown in figure 4.59.

From response received majority of the schools participated in the 2015 camp with 2018 and 2019 tying at 18%, 2016 and 2014 at 7% as shown in figure 4.59.

The head teachers were also asked to rate the UNESCO/GoK STEM Mentorship Programme generally. The results obtained are shown in figure 4.60.

Majority of the head teachers believed the UNESCO/GoK Mentorship Programme was very good and only a few rated it as "good" as presented in figure 4.60.

The rating of the effectiveness of the UNESCO/GoK Mentorship programme on the performance of the students and staff is shown in figure 4.61.

It is evident from figure 4.61 that the programme was generally found to be very effective to both students and staff.

In addition, the assessment sought to establish the impact of the STEM programme activities on the attitudes of both students and staff. The results are shown in figure 4.62.

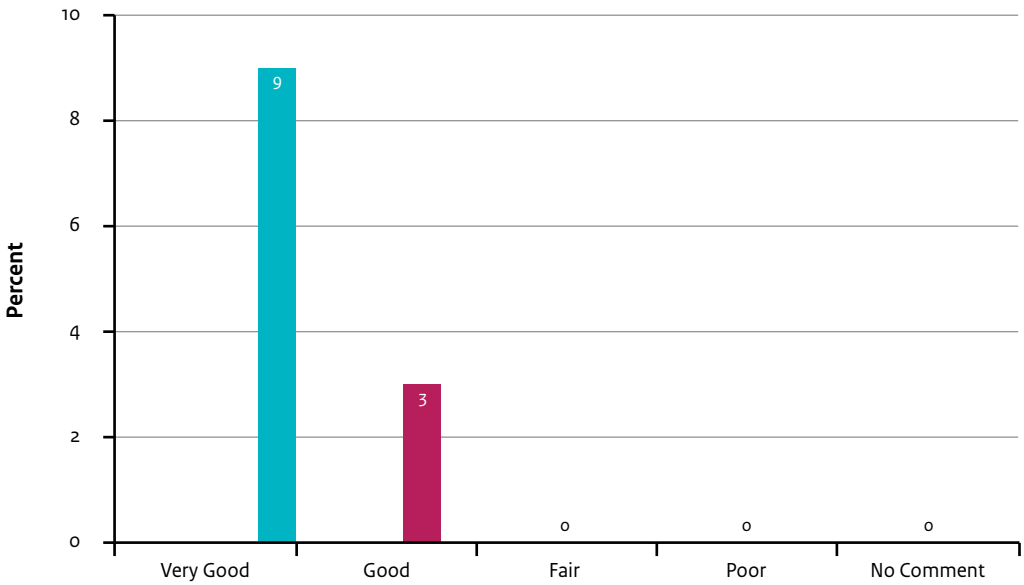

Figure 4.60: General rating of the UNESCO/GoK Mentorship Programme

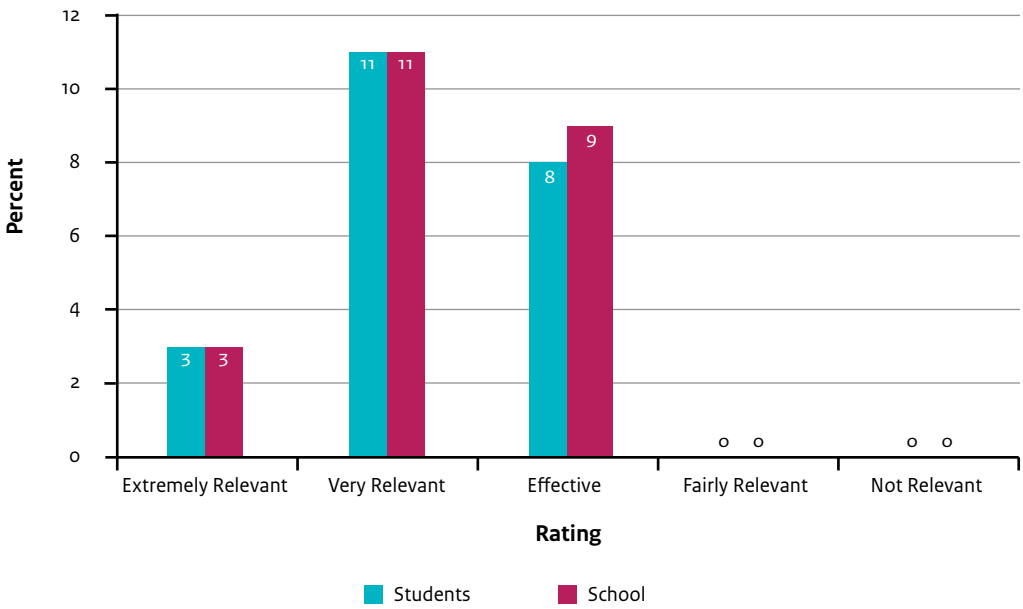

Figure 4.61: Effectiveness of the UNESCO/GoK Mentorship programme on the performance of Students and Staff

From figure 4.62, it is evident that a high positive impact rating was recorded.

In terms of the impact on the performance on the main STEM subjects after the UNESCO/GoK mentorship programme, the results obtained are shown in figure 4.63

From figure 4.63, there was general high performance reported especially in

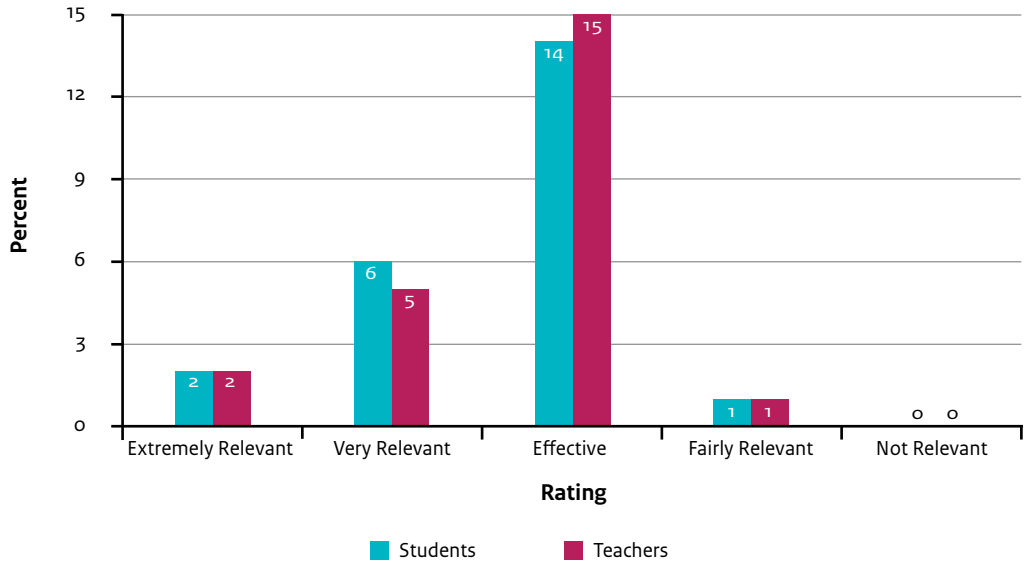

Figure 4.62: Impact of the UNESCO/GoK STEM programme activities on the attitudes of both students and teachers

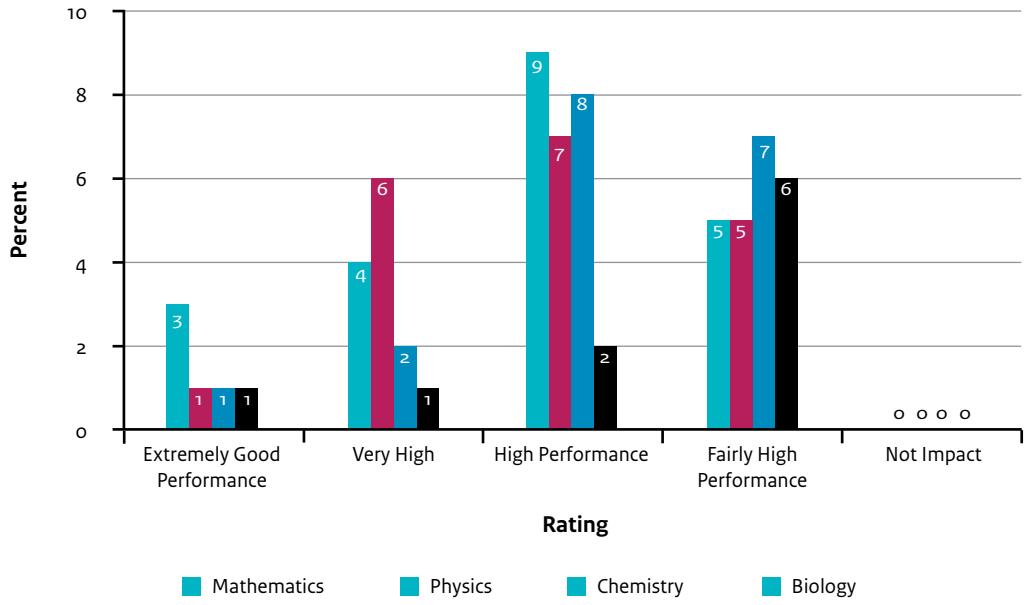

Figure 4.63: Impact of the UNESCO/GoK STEM Mentorship Programme on the performance on the STEM subjects

Mathematics, followed by Physics, chemistry and then biology.

After the mentorship programme, the assessment sought to establish the average mean grade. The results obtained are shown in figure 4.64.

From figure 4.64, it is evident that the average mean grade was B- which is an improvement from C- meaning a positive impact.

From the head teachers' perspective, they had different suggestions on the improvement of future UNESCO/GoK STEM Mentorship Programmes as shown in box 4.4.

Box 4.4: Suggestions on the improvement of UNESCO/GoK STEM Mentorship Programmes by Head Teachers

- The programme should be spread to other subjects - that is art subjects;
- More mentorship should be given to the students and teachers to encourage innovation and incubation of projects;
- It should not be workshop kind but rather a STEM association for young scientists;
- Increase number of days, i.e., propose two days per subject;
- Follow-up should be done immediately at least a year after; Follow-up with the mentored students to see their performance and if they have chosen STEM careers.

4.7 Perception of Ministry officials on the UNESCO/GoK STEM Mentorship Programme

4.7.1 Ministry Officials Profile

The areas of interest regarding the Ministry officials' profile were work focus, area of jurisdiction, rating general performance.

In terms of the focus of work by the Ministry official, the analysed responses are shown in figure 4.65.

In general majority were involved in supervision, policy, and training and staffing

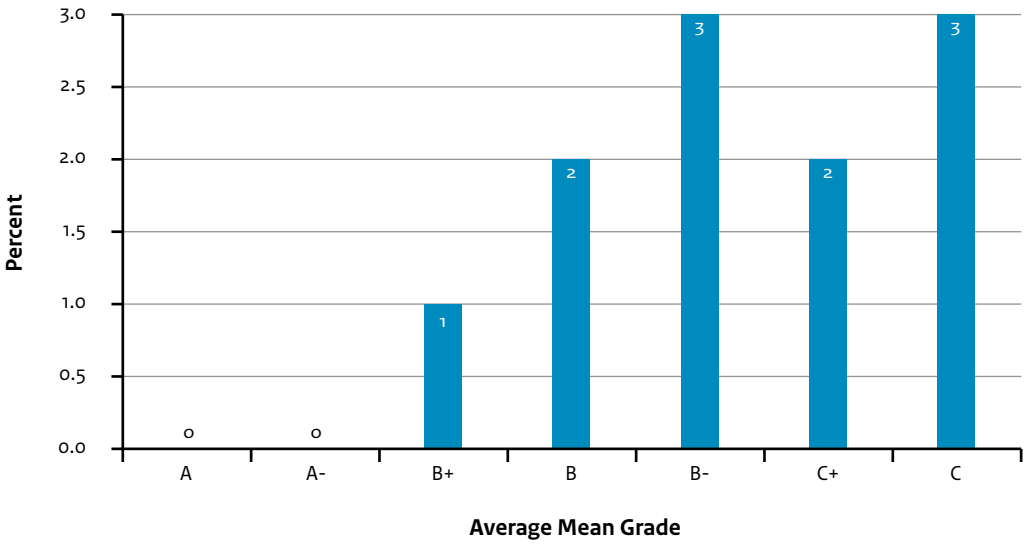

Figure 4.64: Average mean grade after the UNESCO/GoK STEM Mentorship Programme

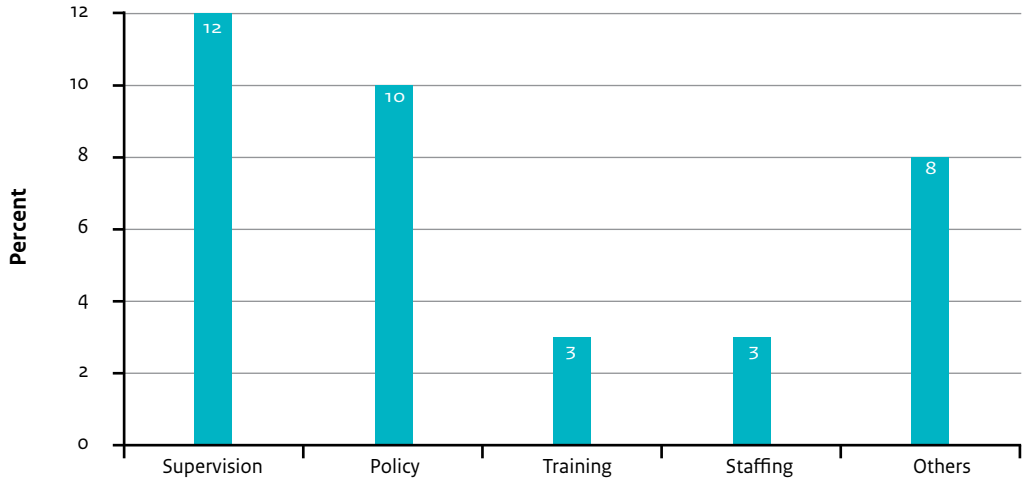

Figure 4.65: Ministry Official focus of Work

as shown in figure 4.65. In addition to the mentioned areas, they also indicated that they are involved in Management quality control, Capacity Building and ICT, Quality assurance, Mentoring and Talent co-curricular development, Mentoring and monitoring of Quality standards.

In terms of the area of jurisdiction, figure 4.66 shows the responses received.

Most of the ministry officials interviewed areas of jurisdiction at County level had 43%, followed by sub-county (29%), Extra County (21%) and least at National level (7%) as shown in figure 4.66.

Further, it was important to establish the performance of the students in the Ministry officials' area of jurisdiction. The results obtained are shown in 4.67.

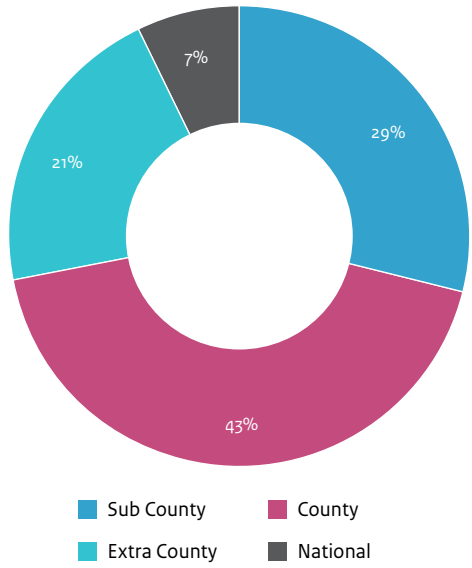

Figure 4.66: Ministry Officials' areas of jurisdiction

From figure 4.67, the responses received showed that most of the students' performance was average at 79% and below average at 21%.

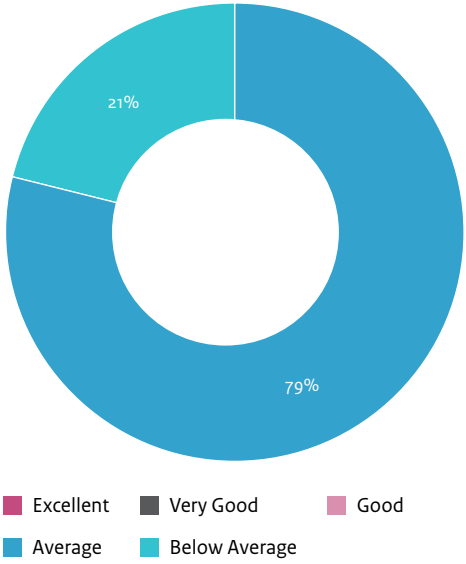

Figure 4.67: General performance of students in the Ministry official's area of jurisdiction

4.7.2 Perception of UNESCO/GoK STEM Activities Through The Ministry Officials Lens

The first thing in assessing the perception of the Ministry officials on the UNESCO/GoK STEM Mentorship Programme was to establish their participation. The results are shown in figure 4.68.

From those interviewed it was found that 86% participated in the UNESCO/GoK STEM Mentorship Programme whereas 14% did not as presented in figure 4.68.

The UNESCO/GoK STEM Mentorship Programme started in 2014 and so it was important to establish which year the Ministry Officials participated in. The results obtained are shown in figure 4.69.

From the cohort interviewed majority participated in the 2019 programme at 92% with only 8% in 2016 as shown in figure 4.69.

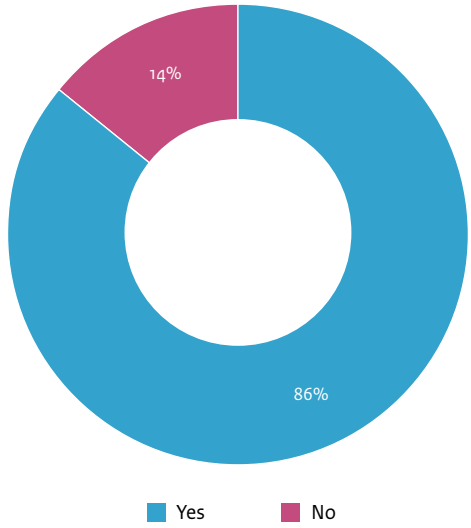

Figure 4.68: Participation of the Ministry Officials in the UNESCO/GoK STEM Mentorship Programme

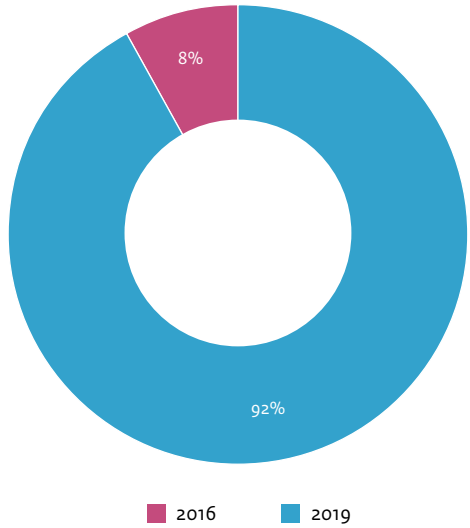

Figure 4.69: Year of UNESCO/GoK STEM Mentorship Programme Participation by Ministry Officials

The general rating of the UNESCO/GoK STEM Mentorship Programme was also assessed. The results of the respondents are shown in figure 4.70.

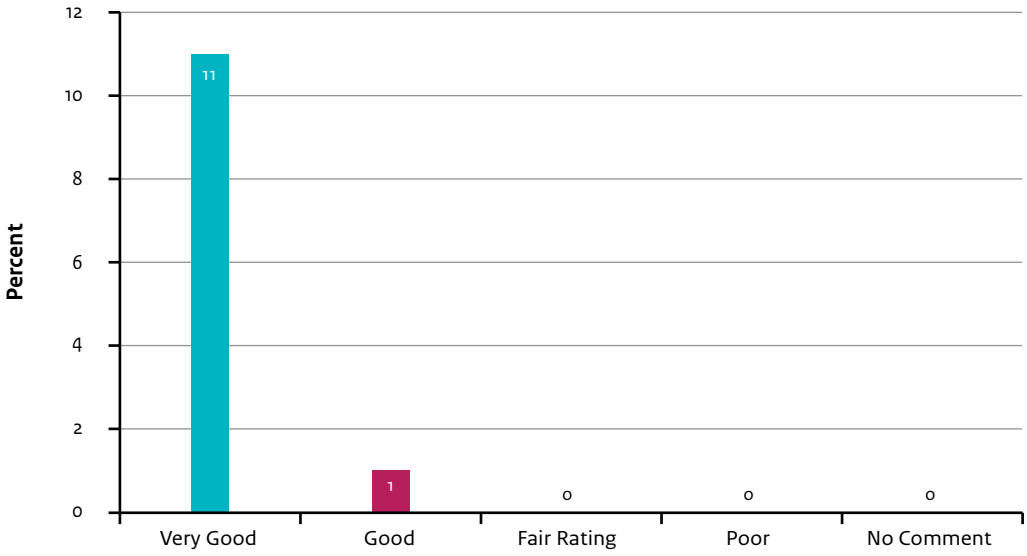

Figure 4.70: Rating of the UNESCO/GoK STEM Mentorship Programme by Ministry Officials

From figure 4.70, majority felt that the UNESCO/GoK STEM Mentorship Programme is very good, an indication of the importance of the exercise to the Ministry.

Rating of the UNESCO/GoK STEM Mentorship Programme activities was also assessed namely, Life and Survival Skills, Making Career Choices in STEM, Talks on STEM courses, Visit to the Learning Environment, Visit to

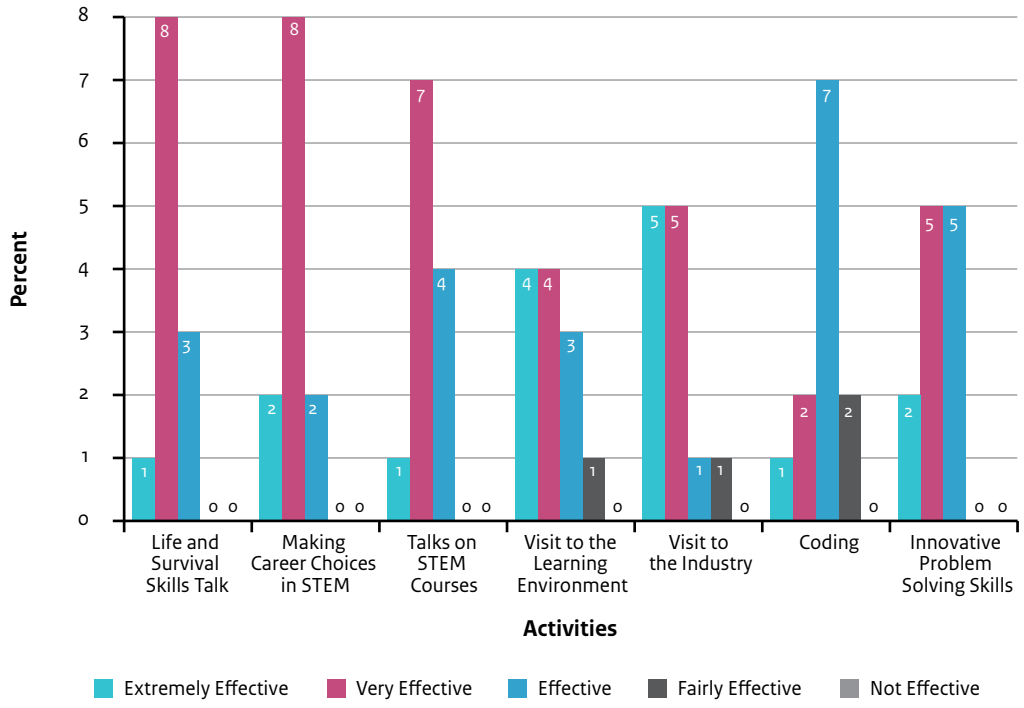

Figure 4.71: Rating of the UNESCO/GoK STEM Mentorship Programme Activities

the Industry, Coding and Innovative Problem Solving Skills. The results obtained are shown in figure 4.71.

From figure 4.71, Life and Survival Skills, Making Career Choices in STEM and Talks on STEM courses and careers were rated as being very effective. Visit to the Learning Environment and Industry (work environment) were rated as being extremely effective whereas coding and innovative problem-solving skills were rated as being effective.

The other assessment that was sought was on the impact of each of the UNESCO/GoK STEM Mentorship Programme on the attitude of the teachers and students in the ministry official's area of jurisdiction. The responses received were analyzed and the results presented in figure 4.72.

The responses received varied from extremely to fairly high positive impact with High Positive Impact being recorded as shown in figure 4.72.

For the students who were candidates, as a follow up on the general performance after the UNESCO/GoK STEM Mentorship Programme, the assessment sought to establish the average mean grade in the ministry official's area of jurisdiction. The results obtained are shown in figure 4.73.

It is evident from figure 4.73 that the highest average mean grade was B followed by C+ and a few schools reporting a D+. This is an improvement from what was reported before the programme that the performance was generally average.

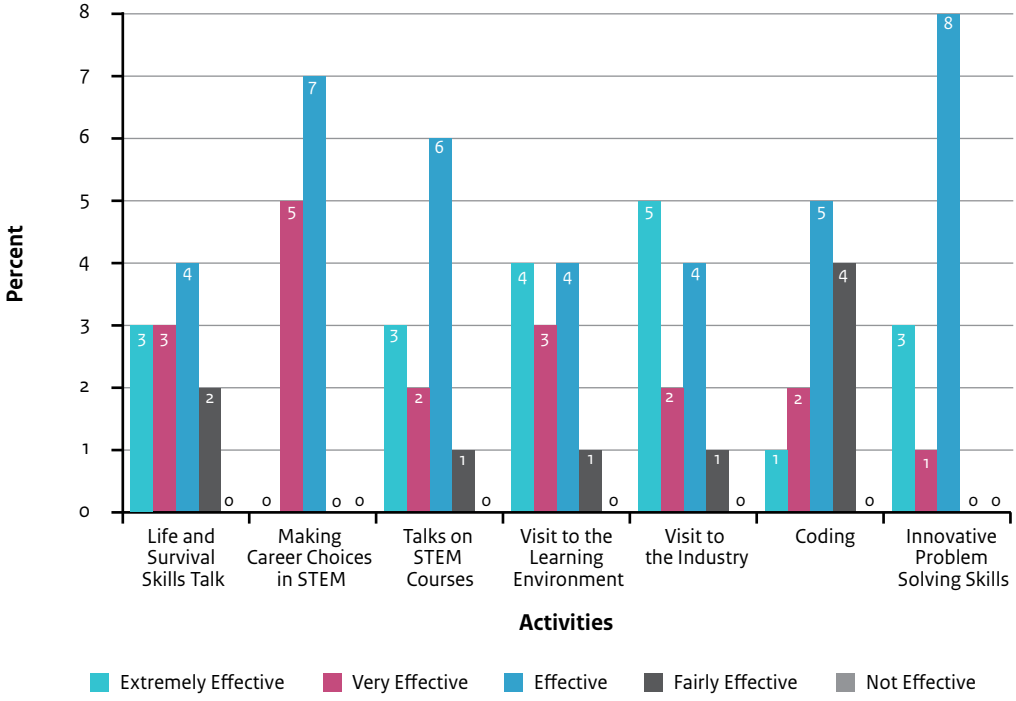

Figure 4.72: Rating of the UNESCO/GoK STEM Mentorship Programme on the attitude of the teachers and students

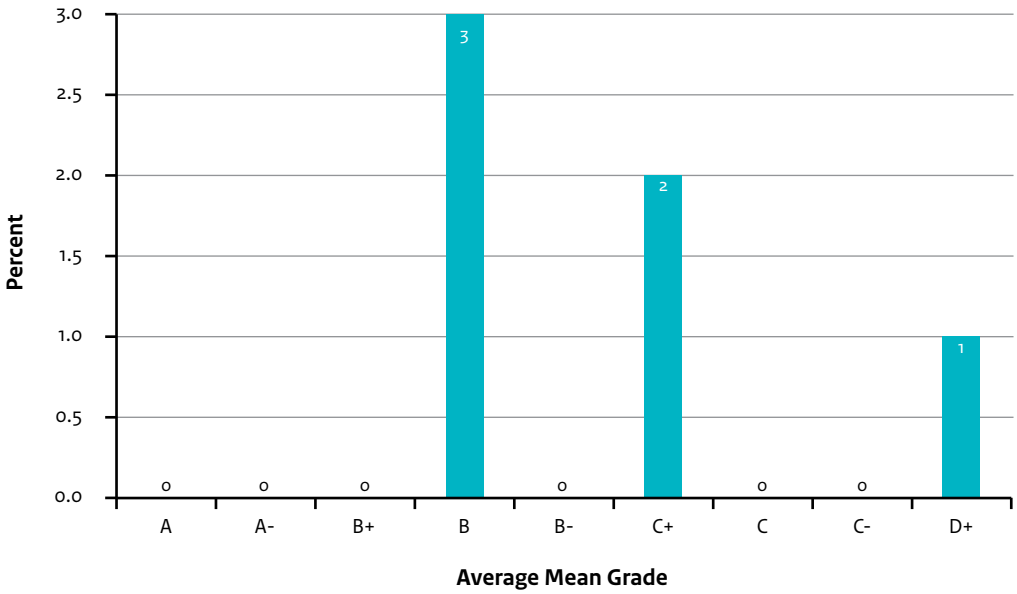

Figure 4.73: Average mean grade after UNESCO/GoK STEM Mentorship Programme

It was also important to establish from the ministry official's point of view whether the UNESCO/GoK STEM Mentorship Programme is ideal in inspiring secondary school students to take up sciences/STEM careers. The results obtained from the respondents are shown in figure 4.74.

From figure 4.74, it is evident that the Ministry Officials felt that the UNESCO/GoK STEM Mentorship Programme is indeed ideal in inspiring secondary school students in taking up STEM careers.

In terms of suggestions on how future UNESCO/GoK STEM Mentorship Programmes can be improved, several suggestions were given as shown in box 4.5.

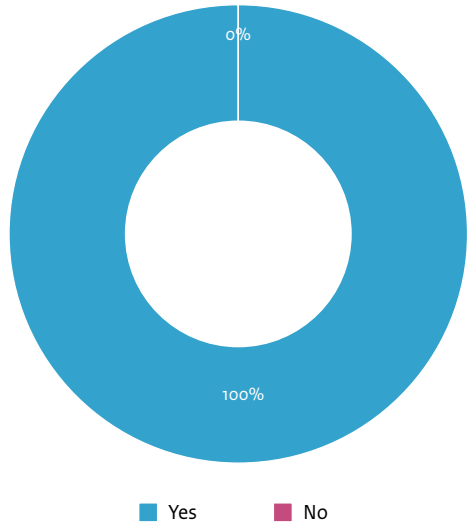

Figure 4.74: Is UNESCO/GoK STEM Mentorship Programme ideal in inspiring secondary school students to take up sciences/STEM careers?

Box 4.5: Suggestions for the improvement of UNESCO/GoK STEM Mentorship Programmes by Ministry Officials

- Help the students to develop confidence and reduce timidity
- It excites the students and encourages them, 75% of the facilitators were well informed and hence impacting the students
- The programme makes the girls aware of their ability in sciences and exposes them to careers in sciences. It removes fear of science and the stereotype that science is hard and meant for boys; girls get a positive attitude/ attitude change. In summary, it impacts positively on their performance and gives them an exposure to future opportunities;
- It changes their thinking and imagination. It awakened them not to think they can only be employed but they can self-employ themselves and be problem solvers by being creative. Also, having a positive attitude that STEM subjects are not hard rather they are manageable and have practical applicability.

4.8 Perception of Higher Education Institutions on the UNESCO/GoK STEM Mentorship Programme

4.8.1 Higher Learning Education Institutions' Staff Profile

The indicators used for Higher Learning Education Institutions' Staff Profile included; Focus of Work in relation to STEM Programmes, Staff Level of Operation, Staff Programme of Specialization, average student enrolment in the STEM programme by gender and finally the rating of Performance of Female Students in the STEM programme on average.

Figure 4.75 below shows the focus of work of staff in relation to the STEM programmes.

From figure 4.75, it is evident that majority of the staff interviewed in the institutions of higher Learning are involved in Teaching and training, whereas supervision, research and skills empowerment rated the same, followed by administration.

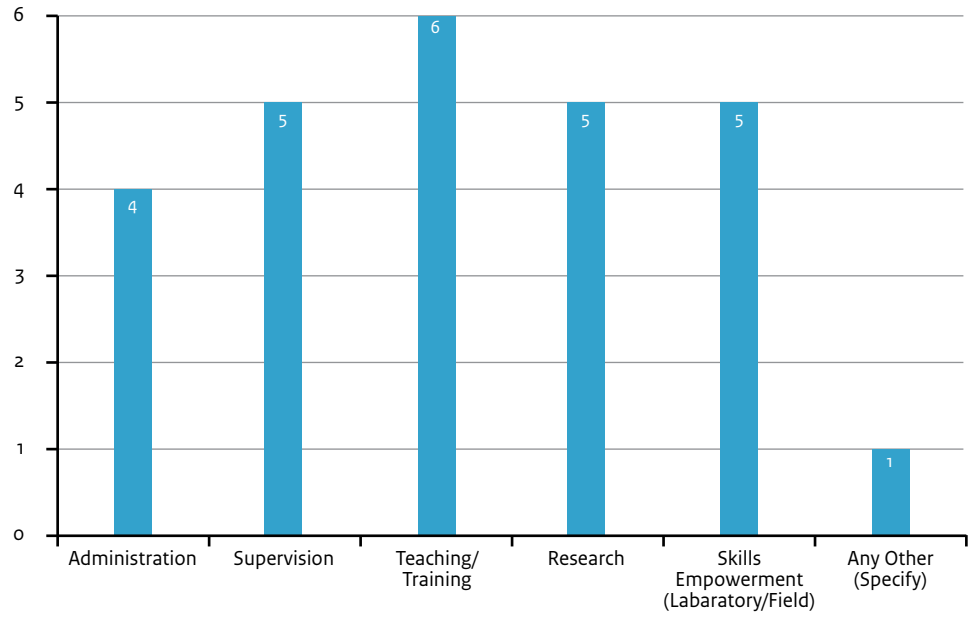

Figure 4.75: Focus of Work of Staff in relation to STEM Programme

In terms of staff level of operation, the results are presented in figure 4.76.

Most of the staff interviewed said they operate at Faculty/Institute/School level followed by Department and finally at college level as shown in figure 4.76.

Further the student enrolment in the sampled programmes by gender was assessed and the results are presented in Table 4.5

On the average performance of the female students enrolled in the said programme, the responses are presented in figure 4.77.

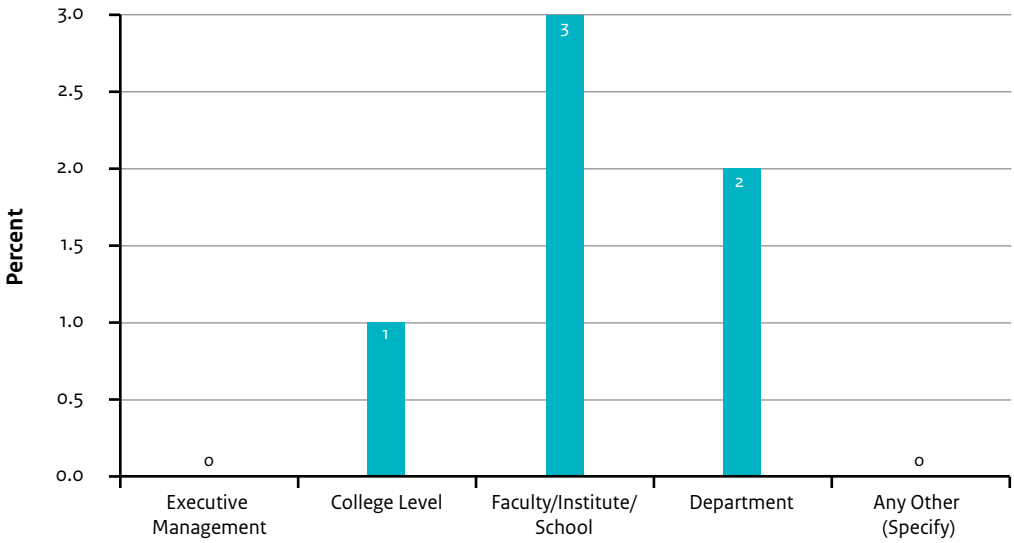

Figure 4.76: Staff Level of operation

Table 4.5: Sampled Programme on Student Enrolment by Gender

Course	Name	Gender	
		M	F
Engineering Based	Civil Engineering	150	20
	Mechanical and Production Engineering	20	5
	Agriculture and Biosystems Engineering	18	2
	Civil Engineering	28	12
	B. Tech in Mechanical Engineering	26	2
	Diploma in Automative Engineering		
	Civil Engineering	400	20
Agriculture	Agriculture	200	50
Mathematics	Mathematics	1000	200
Computer Science and IT	Computer Science and IT	200	30
Physical Sciences Based	Physical Sciences	150	50
Any Other	Aerospace	80	20

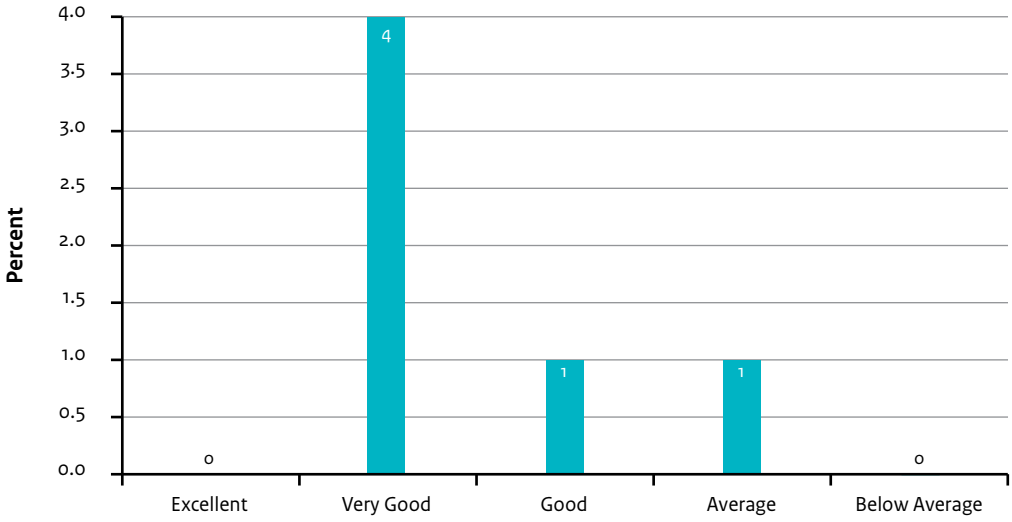

Figure 4.77: Average performance of Female Students in the STEM programmes

From figure 4.77, the staff revealed that the performance of most female students enrolled in the STEM programmes is very good with others rating the performance as good and average.

4.8.2 Perception of UNESCO/GoK STEM Mentorship Programme Through The Higher Learning Education Institutions' Lens

The assessment sought to establish how many of the staff in the institutions of higher education participated in the UNESCO/GoK STEM Mentorship Programme. Figure 4.78 shows the results obtained from the responses.

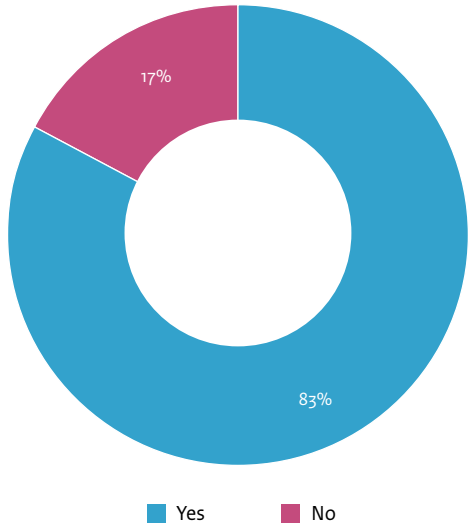

Figure 4.78: Participation of Staff from Institutions of Higher Education in the UNESCO/GoK STEM Mentorship Programme

Figure 4.78 shows that out of those interviewed, 83% confirmed having participated with 17 % not having taken part.

For staff who participated, the assessment sought to establish the year of participation. The results obtained are shown in figure 4.79

Majority of the staff interviewed confirmed having participated in the year 2019 with the rest in the years 2014, 2016 and 2017 as shown in figure 4.79.

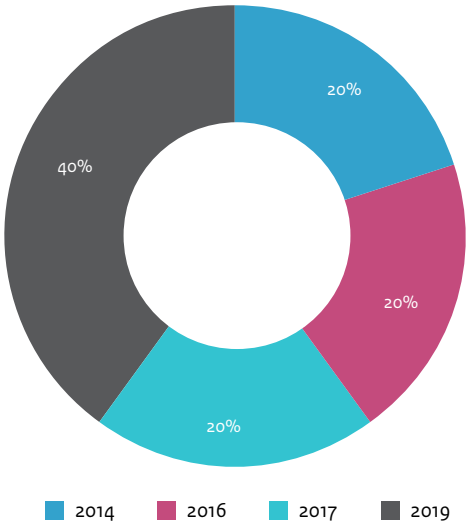

Figure 4.79: Year of Participation in the UNESCO/GoK Mentorship Programme

The subsequent assessment was the level of participation by the staff in the UNESCO/GoK STEM Mentorship Programme whose results are presented in figure 4.80.

It is evident from figure 4.80 that majority participated in the Keynote Address. However, there was also participation in the general/overview address, career talks in STEM as well as Laboratory/Equipment's demonstration.

The rating of the UNESCO/GoK STEM Mentorship Programme by the staff in the institutions of higher education is shown in figure 4.81.

The rating of the UNESCO/GoK of the STEM Mentorship Programme by staff of institutions of higher education was generally very good and good as shown in figure 4.81.

The rating of the UNESCO/GoK STEM Mentorship Programme activities by the staff of institutions of higher Learning is shown in figure 4.82.

The rating of the Life and Survival skills, making career choices in STEM, talks on STEM Programmes, Visit to the Learning Environment, Visit to the Industry (work environment), Coding and Innovative Problem Solving Skills ranged from extremely effective to fairly effective as depicted in figure 4.82

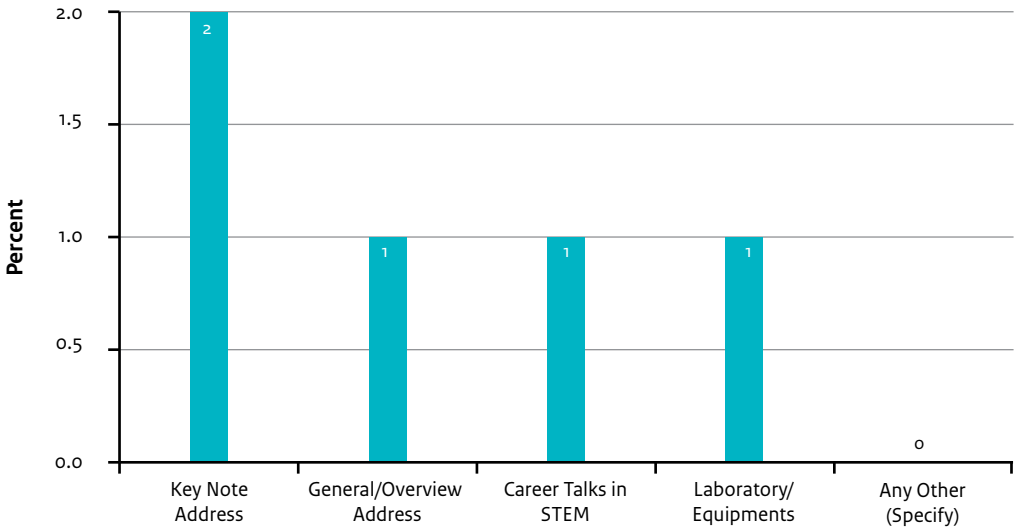

Figure 4.80: Level of participation in the UNESCO/GoK STEM Mentorship Programme

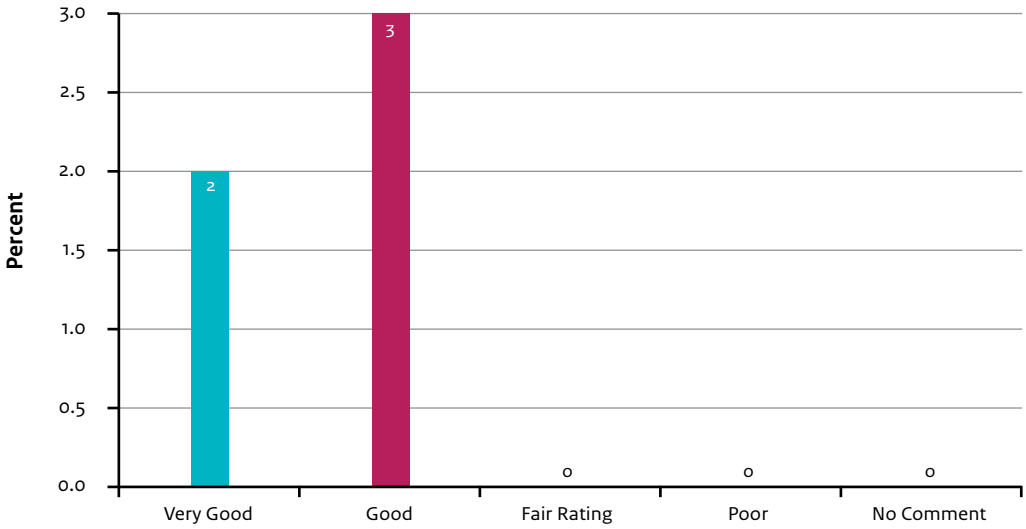

Figure 4.81: Rating of UNESCO/GoK STEM Mentorship Programme by Staff of Institutions of Higher Learning

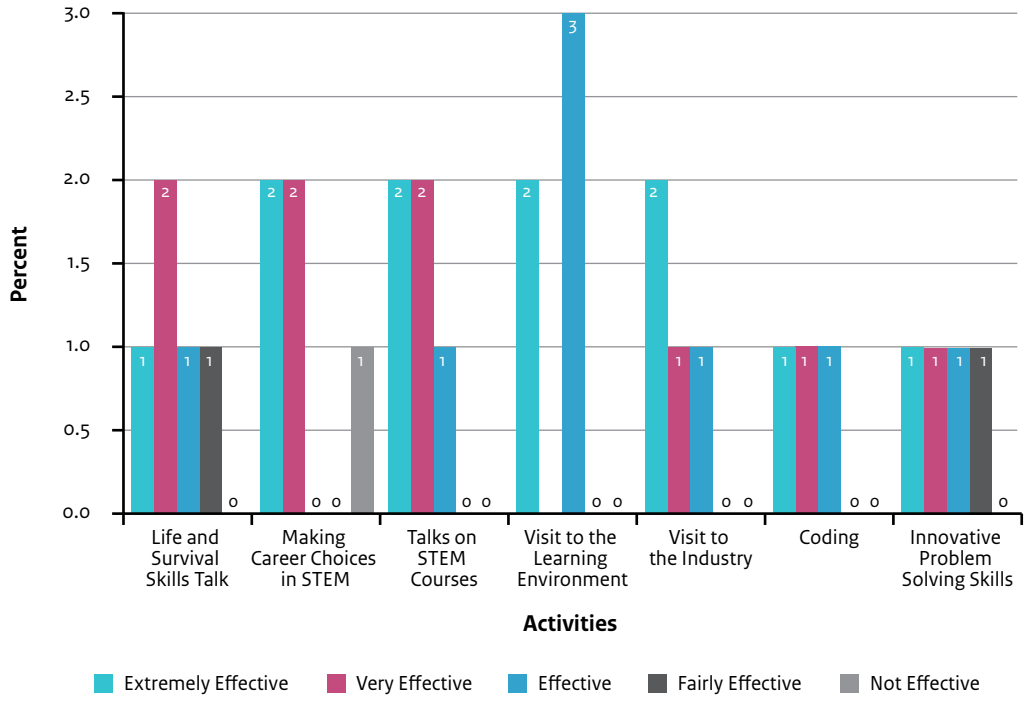

Figure 4.82: Rating of the UNESCO/GoK STEM Mentorship Programme Activities

Further, the assessment sought to establish the impact of the UNESCO/GoK STEM Mentorship Programme on the enrollment of Female Students into the STEM programmes in the institution where the staffs are domiciled. The results obtained are shown in figure 4.83.

From figure 4.83 it is evident that majority of the responses felt that the UNESCO/GoK STEM Mentorship Programme has a high positive impact on the enrollment of Female students into the STEM programmes.

A comparison of the enrollment by female students in some STEM programmes before and after the UNESCO/GoK STEM Mentorship Programme was also done and the results are shown in figure 4.84

For the years 2014, 2016, 2017 and 2019 UNESCO/GoK STEM Mentorship Programmes, it is evident from figure 4.84 that there was an increase in Female student's enrollment.

Interestingly the programmes in question are engineering where there is a marked under representation of female students.

It was also important to find out from the staff who participated in the UNESCO/GoK STEM Mentorship Programmes about their views whether it had an influence on the more female students enrolling in STEM programmes. The results obtained are presented in figure 4.85.

From figure 4.85, there was an overwhelming acknowledgment that the UNESCO/GoK STEM Mentorship Programme did indeed have a positive influence on the number of female students who enrolled in STEM related programmes.

In terms of views on how to improve future UNESCO/GoK STEM Mentorship Programmes, some of the suggestions are contained in Box 4.6.

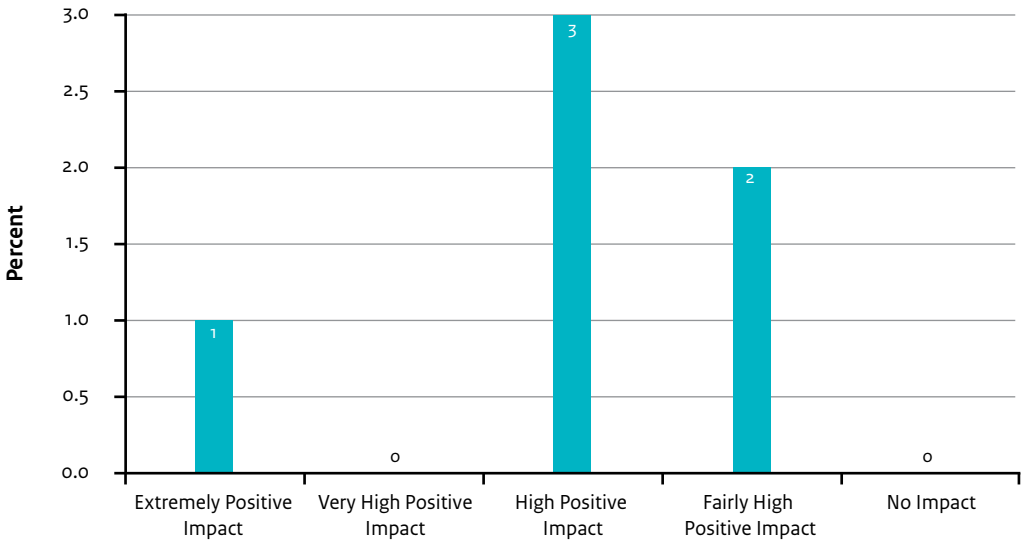

Figure 4.83: Impact of the UNESCO/GoK STEM Mentorship Programme on the enrollment of Female Students into the STEM programmes

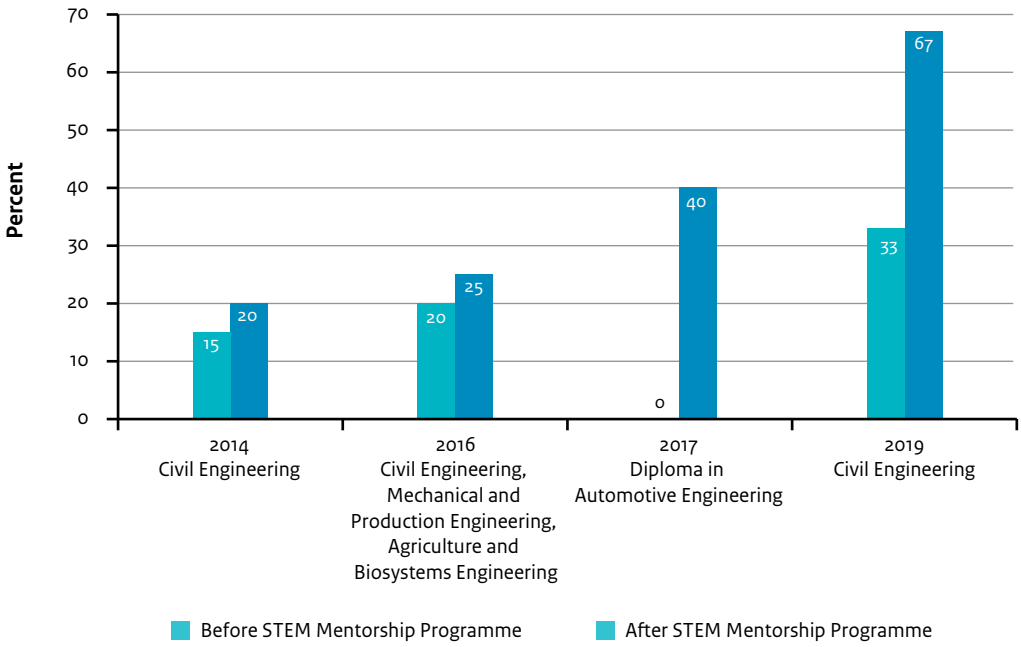

Figure 4.84: Comparison of the enrollment by female students in some STEM Programmes before and after the UNESCO/GoK STEM Mentorship Programme

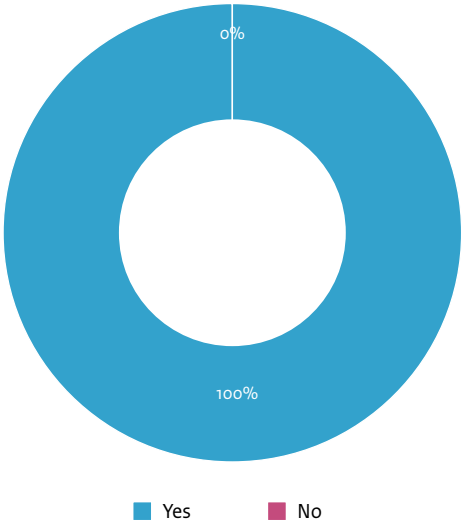

Figure 4.85: Influence of the UNESCO/GoK STEM Mentorship Programme in increase in Female Students in STEM Programmes

Box 4.6: Suggestions on the improvement of UNESCO/GoK STEM Mentorship Programmes by Higher Learning Institutions

- Wider sensitization to all the students about the UNESCO/GoK STEM Mentorship Programme;
- Package the programmes so that it becomes appealing to all;
- Benefits and impact of the mentorship programme to be shared widely with interested parties;
- Increase the number of visits to the industry and be hosted by registered engineers
- Involve both male and female students
- Increase the sessions per region per year

4.9 Perception of Industry on the UNESCO/GoK STEM Mentorship Programme

4.9.1 Industry Profile

The industry profile focused on the work profile, the application of the industry with respect to STEM knowledge and skills, level of qualification of the key personnel with regard to career in STEM specialization, gender distribution and work performance.

In terms of the focus of work of the respondents, the analyses of the results are shown in figure 4.86.

The focus of the work of the respondents varied from management, supervision, policy, training and operations with majority being in management as depicted in figure 4.86.

The application of STEM knowledge and skills in the industry was also assessed and the results are shown in figure 4.87.

The industry involved in the survey were partially STEM at 60% with 40% being purely STEM as shown in figure 4.87.

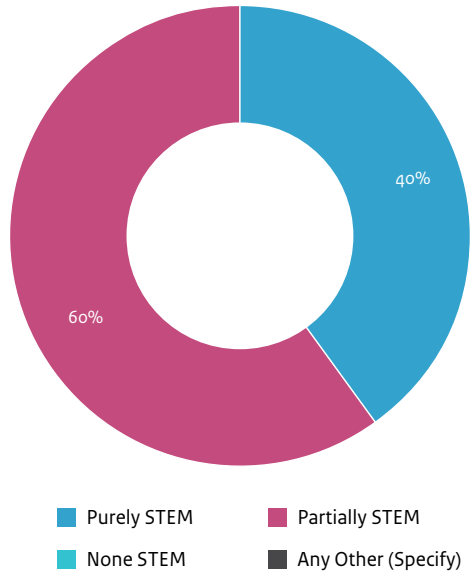

Figure 4.87: Profile of Industry with respect to STEM knowledge and skills

In terms of the level of qualification of the key staff in the industry/institution with respect to STEM career specialization, the assessment output is presented in figure 4.88.

The different key personnel have varied level of education ranging from doctorate degree

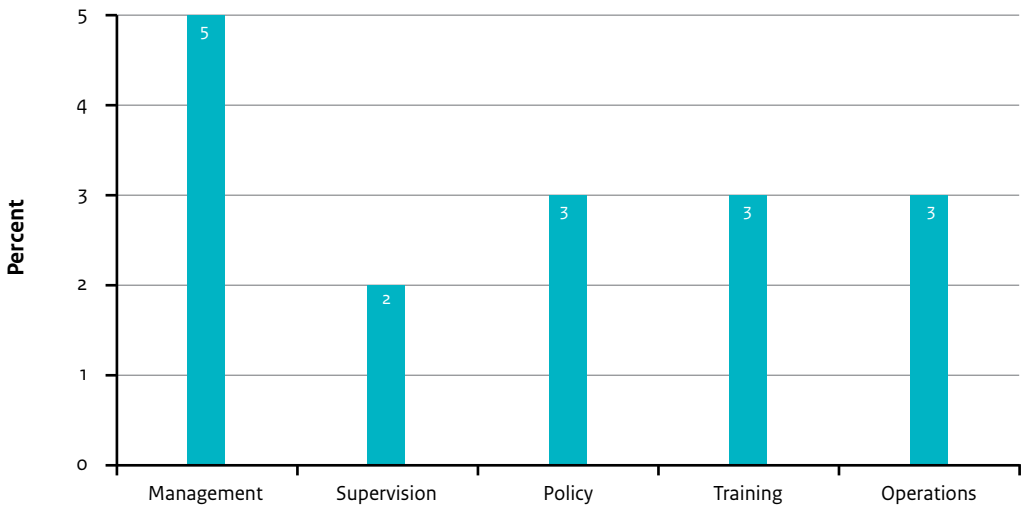

Figure 4.86: Profile of the Industry personnel by work focus

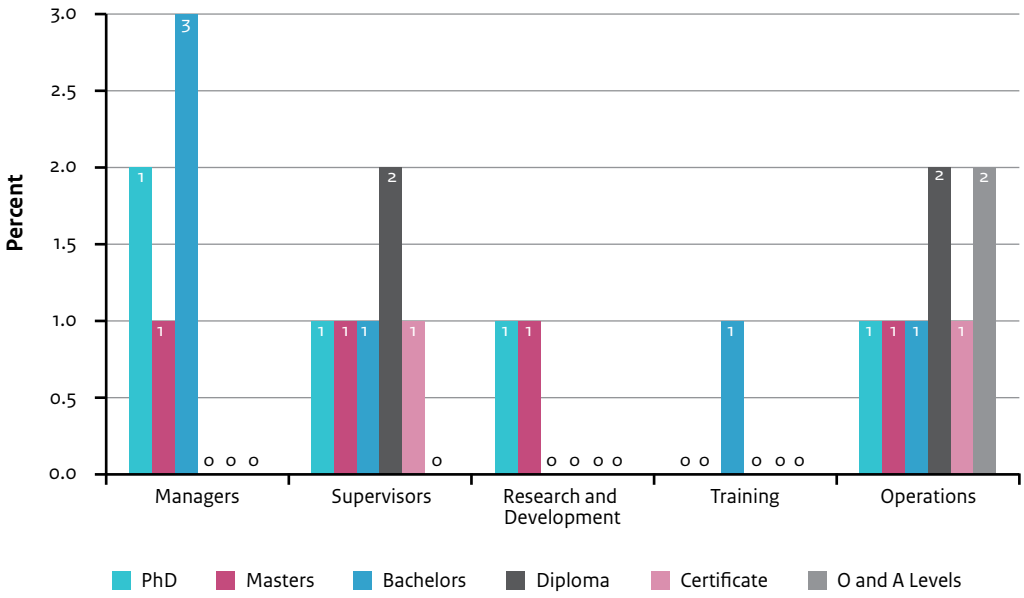

Figure 4.88: Profile of Key Industry personnel by level of Education

to O- and A-Level Certificate qualifications. For managers, the least qualification is a Bachelor's degree, there are supervisors who have a certificate, for research and development, the lowest is a Master's degree, and training is a bachelor's degree whereas for operations, all the levels of qualifications apply as shown in figure 4.88.

An assessment of the gender distribution of the key personnel in the industry/institution with respect to STEM career specialization results are presented in figure 4.89.

From figure 4.89, it is evident that the male gender dominates all levels in the key personnel in the industry from the

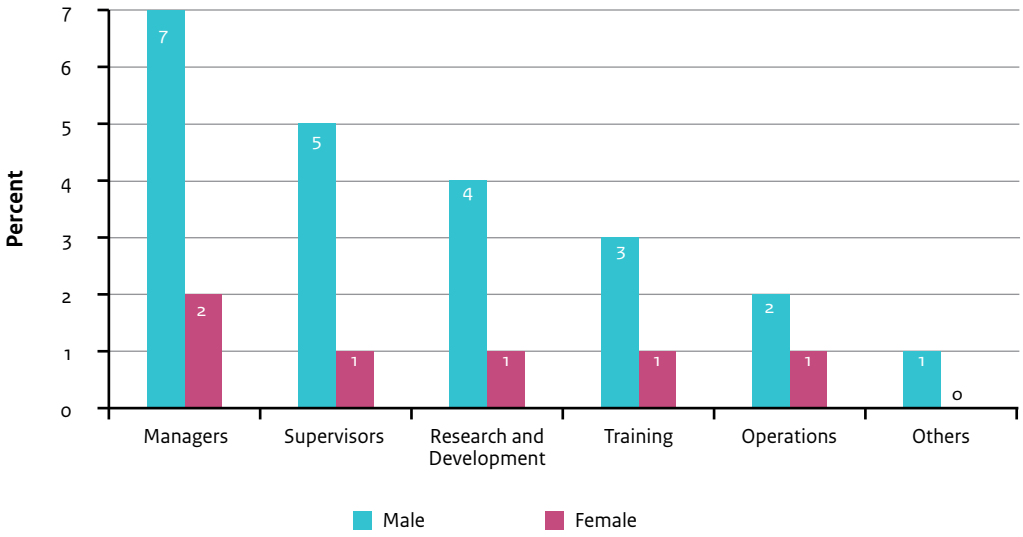

Figure 4.89: Profile of Key personnel in the industry by gender

respondents who participated in the survey. The situation is more pronounced in the upper levels namely managers, supervisors as well as in research and development.

The assessment sought to establish the general work performance with respect to gender at various levels in the industry. The results obtained are presented in figure 4.90.

In terms of performance by gender, it is again evident from figure 4.90 that the male gender outperforms the female gender with the average performance associated with the female.

4.9.2 Perception of UNESCO/GoK STEM Mentorship Programme Through The Industry Lens

The assessment sought to establish the perception of the UNESCO/GoK STEM Mentorship Programme by the industry. This was done by generally rating the programme and the activities, assessing the impact of exposure of students in the industry with regard to choosing a STEM career and further establishing whether STEM Mentorship Programme is ideal in the inspiring secondary school girls in taking up Science which lead to STEM careers.

The general rating of the UNESCO/GoK STEM Mentorship Programme by the industry is shown in figure 4.91.

From the industry's perspective, the UNESCO/GoK STEM Mentorship Programme is generally good as shown in figure 4.91.

In terms of the UNESCO/GoK STEM Mentorship activities' evaluation, the results are presented in figure 4.92

The rating of the programme activities namely life and survival skills; making career choices in STEM; talks on STEM programmes; visit to the learning environment; visit to the industry (work environment); coding and innovative problem solving skills from an industry's' perspective they were found to be extremely effective and effective as shown in figure 4.92.

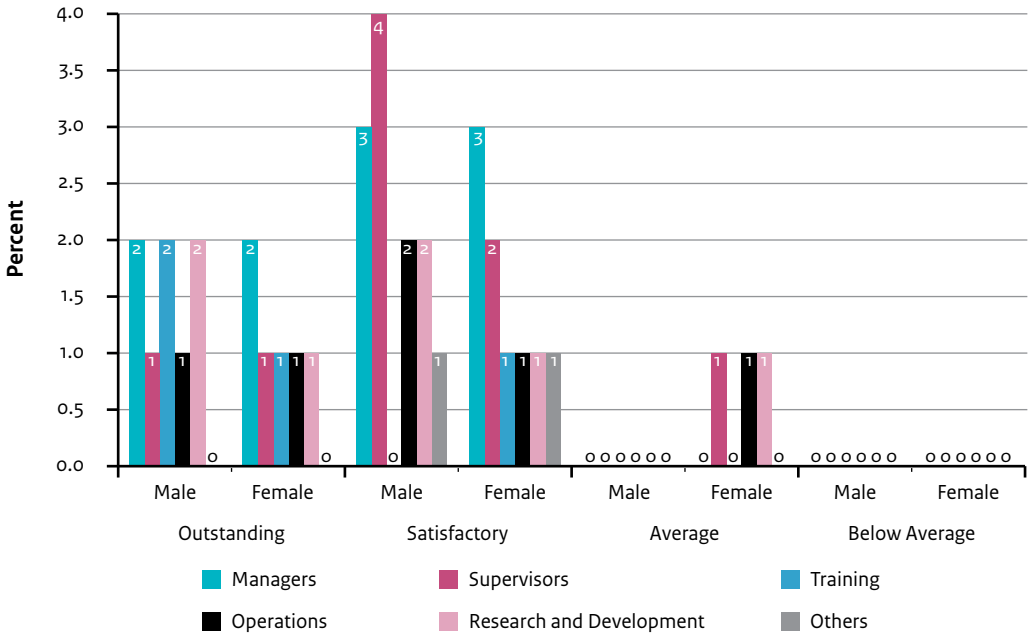

Figure 4.90: Profile of performance of key personnel in the industry by gender

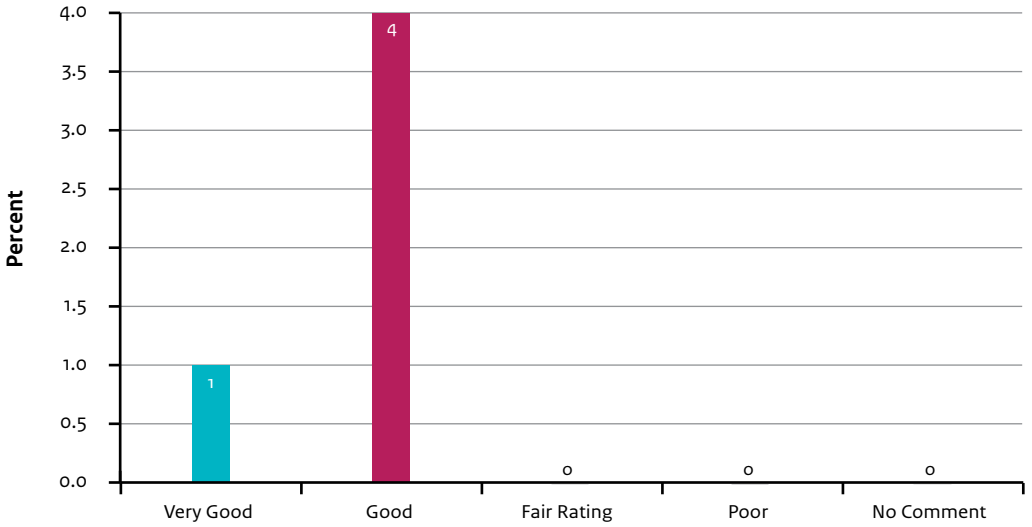

Figure 4.91: General rating of the UNESCO/GoK STEM Mentorship Programme by the Industry

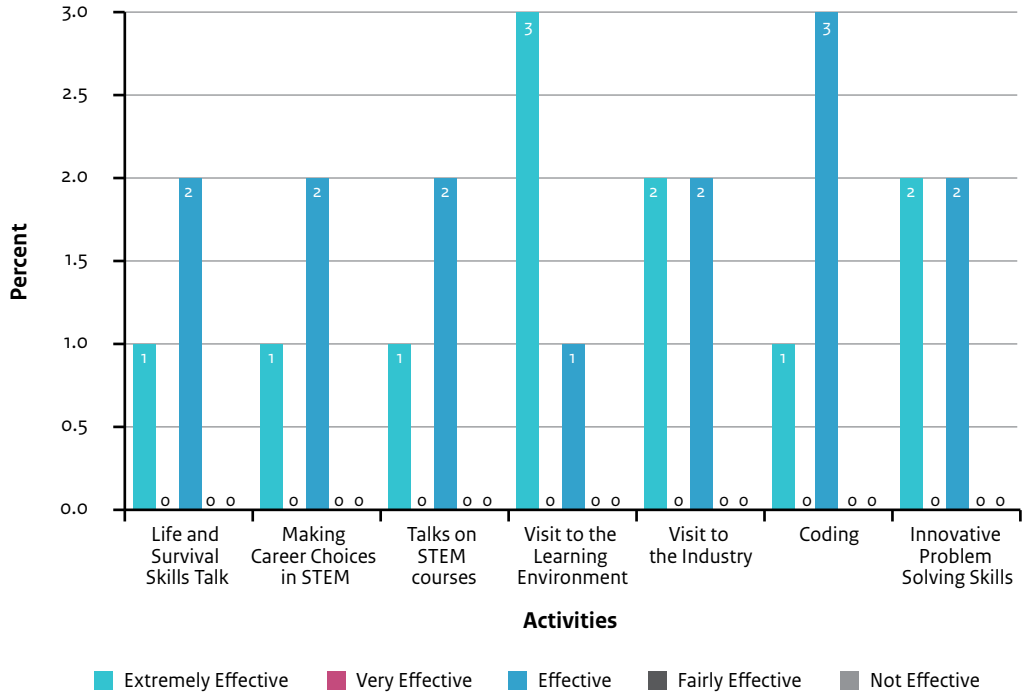

Figure 4.92: Rating of the UNESCO/GoK STEM Mentorship Programme Activities

The impact of the exposure of the students to the industry regarding choosing a STEM career was also done and the results are shown in figure 4.93.

The exposure of students to the industry does indeed have a very high positive impact in influencing the choice of a STEM career as shown in figure 4.93.

In terms of whether the UNESCO/GoK STEM Mentorship Programme is ideal in inspiring secondary school girls in taking up sciences and subsequently STEM careers, the assessment results are in figure 4.94.

From an industry's perspective, there was an overwhelming belief that exposure of secondary school girls in the UNESCO/

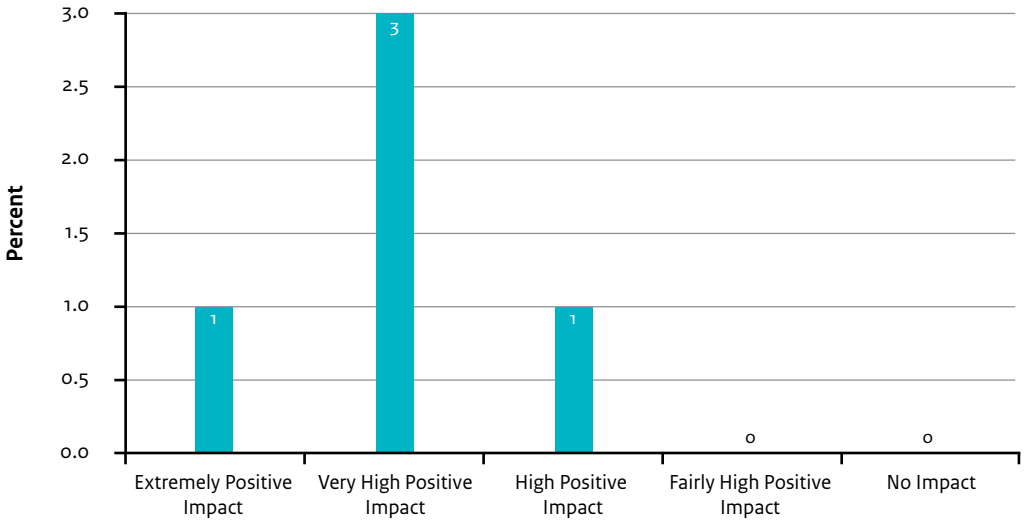

Figure 4.93: Rating of the Impact of Exposure of Students to the Industry (work environment) regarding a STEM career choice

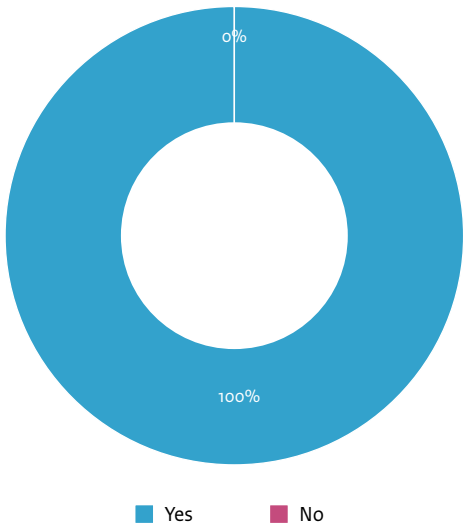

Figure 4.94: UNESCO/GoK STEM Mentorship as an Inspiration to Secondary School Girls in taking Science/STEM Careers

GoK STEM Mentorship Programme does indeed motivate them in taking sciences which eventually lead to uptake of STEM careers as shown in figure 4.94. Some of the explanations given include:

- Mentorship does inspire girls to have confidence to get into STEM careers believing that they will excel too and compete equally with the boy child in STEM careers
- The programme presents a user-friendly approach for students making understanding and grasping of concepts in Science, Technology, Engineering and Mathematics easier.
- They come to know about STEM early enough to make an informed decision.
- Because it identifies them from the right age in career aspirations and impacts on them positively.

Box 4.7: Suggestions on the improvement of UNESCO/GoK STEM Mentorship Programme by Industry

- Involve more/reach out to more girls;
- Find engaging ways to involve the girls right from elementary classes;
- Diversify STEM mentorship activities;
- Utilize social media platforms and digital platforms for STEM activities;
- To include more trips exposures for the girls;
- Develop more working partnerships between academia and industry;
- Develop a long-term mentor –student relationships for the students to have a reference point when in doubt;
- Identify contact persons in schools to lead the programme;
- Partner with relevant stakeholders for more inclusivity and collaborations;
- Use those who have benefited to become your ambassadors

On suggestions on improvements of future UNESCO/STEM Mentorship Programmes, several points were given as shown in Box 4.7.

4.10 Perception of Mentors on the UNESCO/GoK STEM Mentorship Programme

4.10.1 Mentors' Profile

The targeted eight (8) mentors drawn from the industry, academia and government institutions responded to the questionnaire. The broad areas they were interviewed in were specifically on work profile with respect to STEM and their perception on the UNESCO/GoK STEM Mentorship Programme.

Figure 4.95 shows the area of focus by the mentors who participated in the exercise.

From the analysis, it was established that majority of the mentors are involved in research at 44.4%, whereas management and policy tied at 22.2% and the rest work focus being training at 11.1% as shown in figure 4.95.

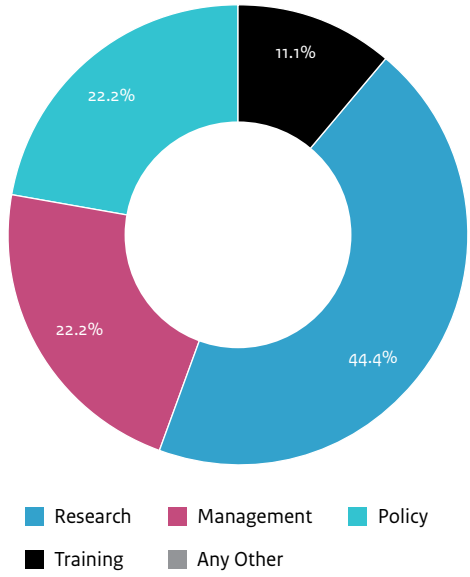

Figure 4.95: Profile of Mentors by area of focus

The assessment sought to establish the level of application of STEM knowledge and skills in the Institutions Mentors are deployed in. Figure 4.96 shows the results.

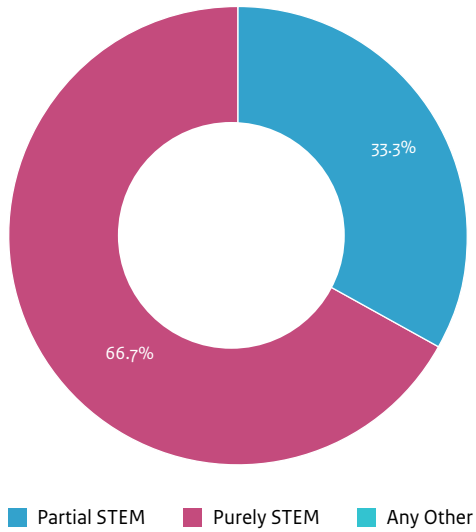

Figure 4.96: Profile of Mentors by the application of STEM Knowledge and Skills in the Institutions

Most mentors reported that their institutions are partially STEM at 66.7% with 33.3% being purely STEM as shown in figure 4.96.

In terms of key staff, namely, Managers, Supervisors, Research and Development, Trainers, Technologist and any other in the institutions where mentors work, it was also of interest to establish the highest level of academic qualification ranging from PhD to Certificate.

Figure 4.97 shows the information obtained after analysis with regard to the highest level of qualification of the key staff in the institution in terms of STEM career specialization.

It is evident that the highest level of academic qualification is associated with the highest-ranking staff compared to the lower ranks as shown in figure 4.97. For instance, majority have a PhD with the others having Masters, Bachelors and Diploma.

This being a STEM Mentorship Programme with a bias in encouraging girls to pursue STEM based courses with a view to inspiring them to take up STEM careers, gender distribution of the key personnel in the mentor's institution with respect to STEM career specialization is a good indicator in demonstrating the challenges associated with Women and STEM even in the work place. The analysis is shown in figure 4.98.

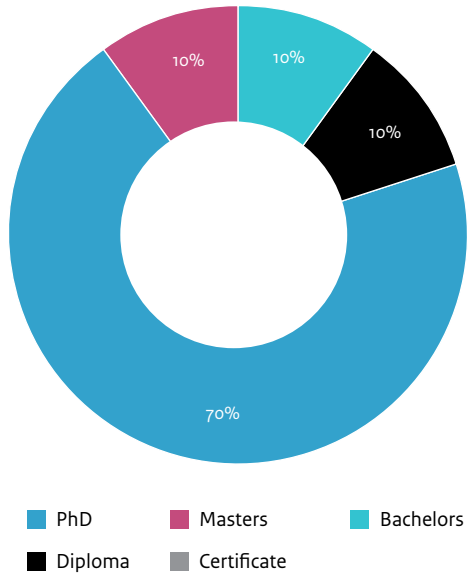

Figure 4.97: Level of academic qualification for the different level of staff

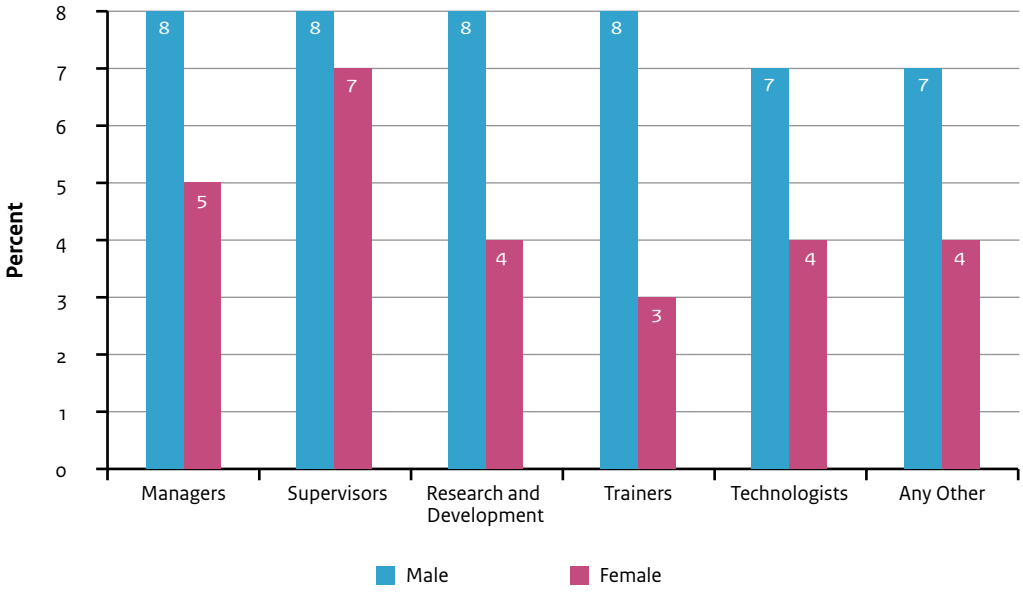

Figure 4.98: Gender Distribution of Key Personnel

In the institutions where mentors work, it was established that males dominate in all the key positions including technologists as demonstrated in the results presented in figure 4.98. This demonstrates the need for mentorship to encourage more women to take up senior positions in various institutions.

4.10.2 Perception of UNESCO/GoK STEM Mentorship Programme Through The Mentors' Lens

In order to understand the perception of Mentors on the UNESCO/GoK a number of questions were posed with regard to when the mentors participated in the programme, area of participation, general rating of the mentorship programme, rating of the impact of the mentorship programme in choosing a STEM career as well as the overall impression of the UNESCO/GoK mentorship programme in Kenya.

The UNESCO/GoK STEM Mentorship Programme started in 2014. Figure 4.99 shows the participation of the Mentors from the base year of 2014.

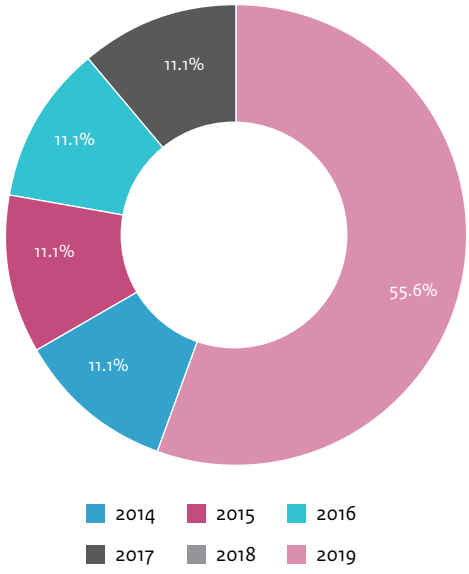

Figure 4.99: Year of Participation of Mentors in the UNESCO/GoK STEM Mentorship Programme

Majority of the mentors participated in the 2019 UNESCO/GoK STEM Mentorship Programme at 55.6%. This demonstrates the commitment the mentors have in programme.

The structure of the UNESCO/GoK STEM Mentorship Programme is such that the students are exposed to life skills, career choices in STEM, visit to the academic institution's as well as the work environment. For the assessment it was necessary to establish the area of participation. Figure 4.100 shows the response with respect to this indicator.

The results obtained demonstrated that majority of the mentors participated in the segment on Talks on STEM courses at 55.6% with making career choices in STEM at 33.3% and life and survival skills talk taking 11.1% as shown in figure 4.100.

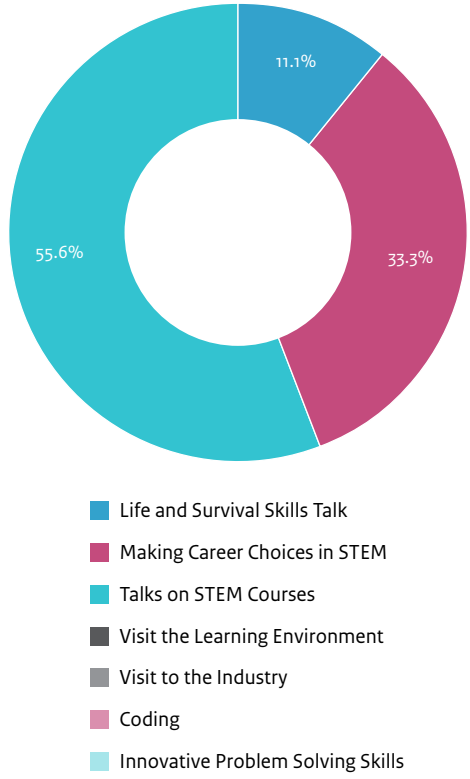

Figure 4.100: Area of Participation in the UNESCO/GoK STEM Mentorship Programme by Mentors

Rating of UNESCO/GoK STEM Mentorship Programme by mentors from very good to no comment is illustrated in figure 4.101.

Majority of the mentors agreed that the mentorship programme in general is very good as shown in figure 4.101

The assessment assumed that Mentors have had a chance to participated in other mentorship programmes. In this regard it was found necessary to compare the UNESCO/GOK Mentorship programme with other mentorship programmes that they have participated in/been part of. Figure 4.102 shows the outcome.

From the results obtained in figure 4.102, it was established that in comparing the UNESCO/GoK STEM Mentorship Programme to other mentorship programmes that mentors have participated in, it is unmatched with majority rating it as very good.

Considering the various activities on the UNESCO/GoK STEM Mentorship Programme from talks, visits to the learning and industry, coding and innovative problem-solving solutions, it was found necessary to seek the opinion of the mentors on their effectiveness. The results of this assessment are shown in figure 4.103.

The assessment by the mentors on the programme activities revealed that Life and Survival Skills talk, making Career Choices in STEM and Visit to the Learning Environment are extremely effective as shown in figure 4.103. Talks on the STEM programmes and visit to the Industry tied at both extremely and very effective rating. Coding and Innovative problem-solving skills were found to be very effective. It can therefore be concluded that the activities carried out on the UNESCO/GoK STEM Mentorship Programme are extremely useful.

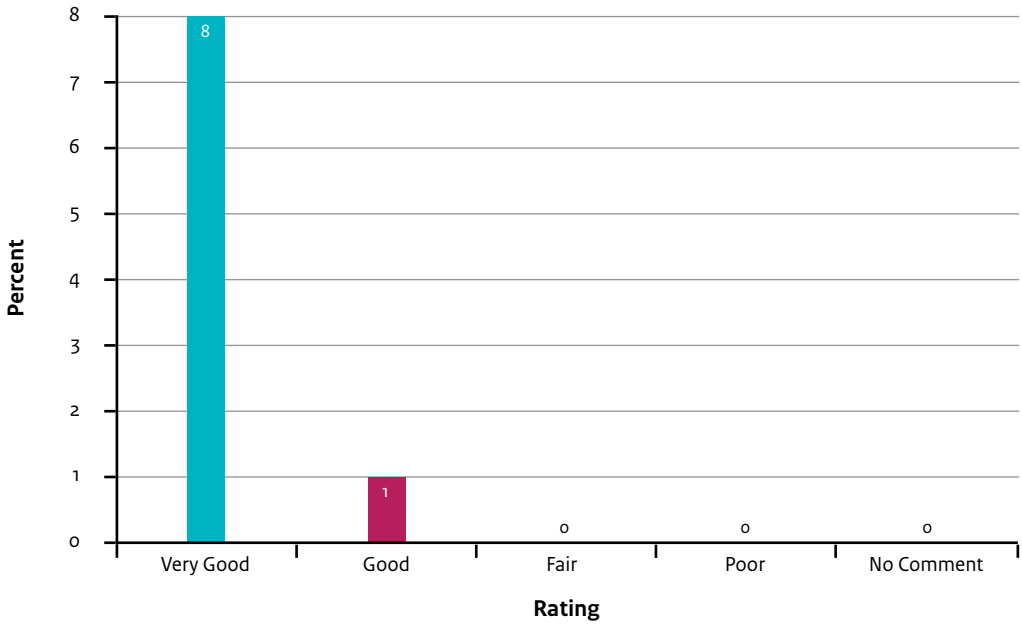

Figure 4.101: Rating of UNESCO/GoK Mentorship Programme by Mentors

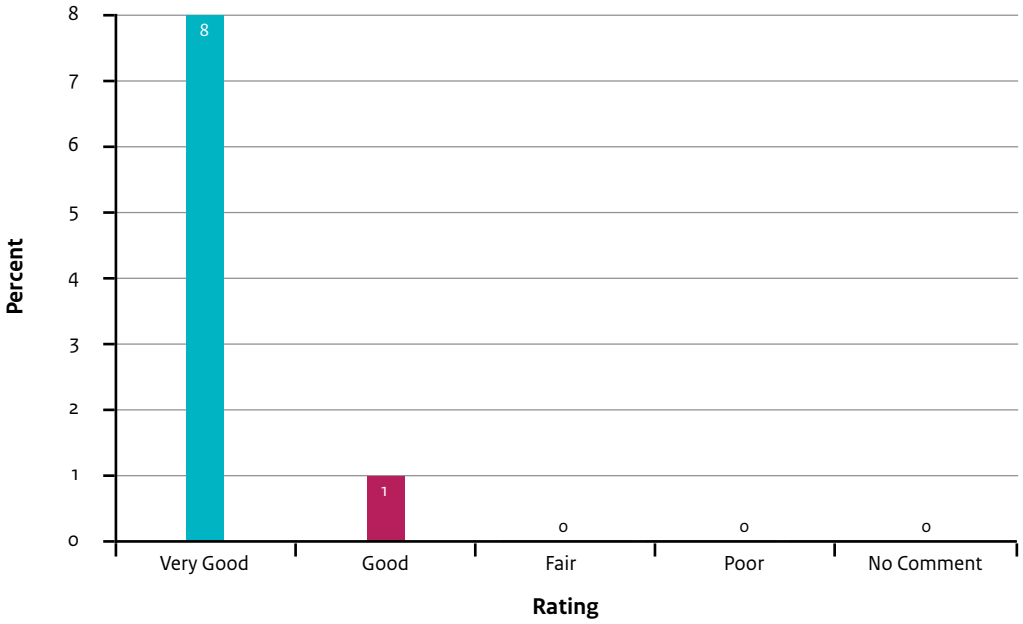

Figure 4.102: Comparison of UNESCO/GoK Mentorship Programme to others

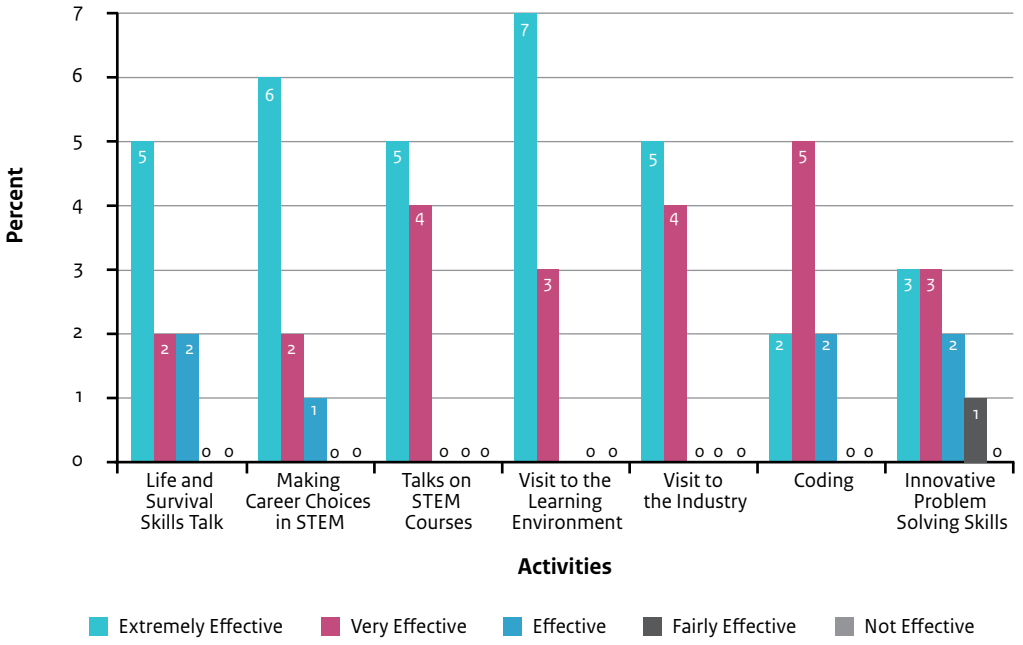

Figure 4.103: Effectiveness of the UNESCO/GoK STEM Mentorship Programme activities

One of the objectives of the UNESCO/GoK STEM Mentorship Programme is to encourage girls to take up STEM subjects that will lead to pursuing a STEM career. In this regard it was necessary to find out from the mentors what they thought in terms of the impact of the Mentorship programme in influencing the choice of a STEM career. The output obtained is shown in figure 4.104.

Most of the mentors were of the opinion that the UNESCO/GoK Mentorship Programme will have an extremely positive impact in choosing a STEM career with a few giving it very high positive impact as shown in figure 4.104.

Assessing the overall impression of the UNESCO/GOK STEM Mentorship Programme in Kenya through the mentors' lens is shown in figure 4.105

The mentors believed the UNESCO/GoK STEM Mentorship Programme in Kenya is extremely useful by the majority and a few of them rated it as very useful as shown in figure 4.105. The implication therefore is that this programme is useful at the national level.

In terms of suggestions of improvement of the UNESCO/GoK STEM Mentorship Programmes, the mentors gave their views as contained in Box 4.8

Box 4.8: Suggestions on the improvement of UNESCO/GoK STEM Mentorship Programmes by Mentors

- The programme should also include the boy child
- To involve more academics from Higher Education Institutions for wider exposure to girls and "boys";
- More time for sessions, more speakers;
- Put in place a mechanism to follow up on girls who attend the mentorship camp to be able to evaluate the impact of the programme;
- The programme should be cascaded to as many schools in Kenya as possible;
- The programme could partner with county governments to ensure its penetration to rural schools in the counties;
- Provide a digital platform for the STEM programme to reach as many girls as possible;
- Additional funding to enrol more girls to the mentorship programme;
- Increase the scope of mentorship to include other STEM fields that may not be covered already.

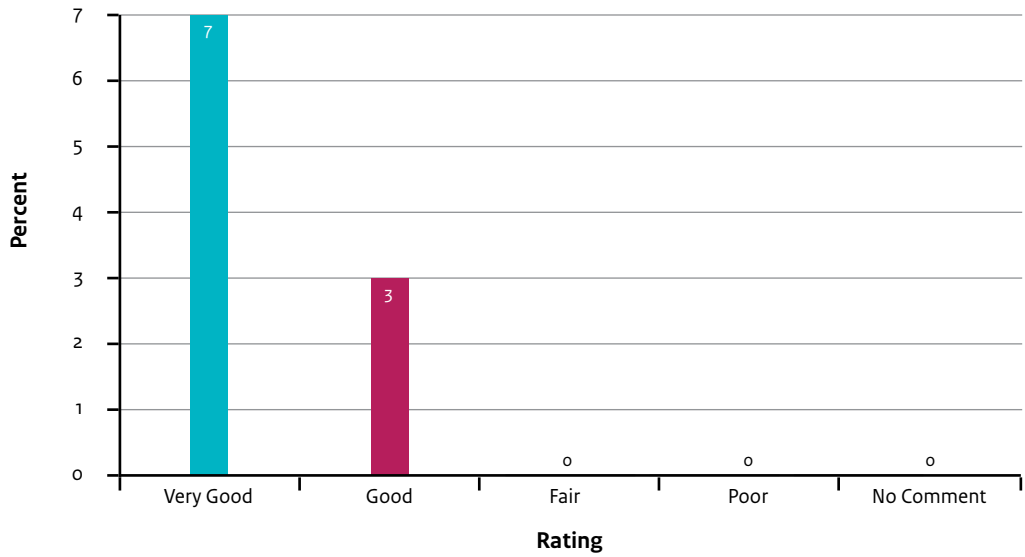

Figure 4.104: The impact of mentorship on choosing a STEM career

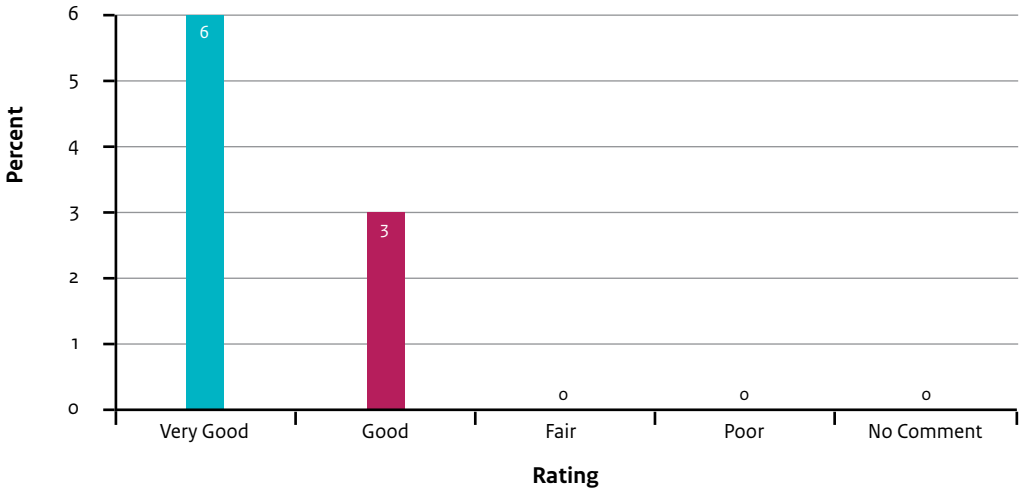

Figure 4.105: Overall impression of the UNESCO/GOK STEM Mentorship Programme in Kenya

Digital UNESCO/GoK STEM Mentorship Programme

5

In the face of COVID 19 pandemic, UNESCO responded swiftly by adopting technology to connect students to the STEM Mentorship Programme. This involved Mentors preparing and recording their Mentorship Talks and having them aired on one National Radio Station, namely the Kenya Broadcasting Corporation. The talks were in the fields of Basic Sciences (Biology, Chemistry, Mathematics and Physics); Applied sciences (Engineering, Architecture, Geology, Agriculture, Marine Sciences and Climate Science) and Survival Skills. Each talk was aired live on the National Radio Station on a Saturday morning and thereafter provided the students with an opportunity to engage the Mentors on a Question and Answer Session through a moderator.

Community Radio stations were also engaged to air the talks to reach as many students as possible especially those in the rural areas where mainstream radio does not reach. To ensure continued connection and interaction with the mentors, a digital platform titled "UNESCO ASK A STEM MENTOR PLATFORM" was developed in partnership with Safaricom and Eneza Educational Foundation. The students were informed about the Platform by the Broadcasting stations and encouraged to send questions via a Short Messaging Service (SMS) where mentors would respond to the different questions in their respective areas of specialization.

The digital programme received an overwhelming response from students and in this case including boys. The digital STEM Mentorship Programme went a step further to not only target the girls but also boys who participated equally in asking questions on live radio sessions. Similarly, the programme reached both teachers and parents as well as community members with messages advocating against gender stereotypes and the importance of valuing and encouraging good performance by children irrespective of their gender.

Box 5.1 shows all the STEM role models and mentors who have made this UNESCO/GoK STEM Mentorship Programme a success as well as those mentors whose voices were aired to the students in the digital STEM Mentorship and the link to their respective podcasts.

Box 5.1: STEM Role Models and Mentors

Dr. Peggoty Mutai is a Kenyan woman in Science in the field of Pharmacy. She is a lecturer at the University of Nairobi, School of Pharmacy. She was first recipient of the UNESCO-L'Oreal For Women In Science Award for young women in Life Sciences (2012). Her work involves drug discovery from natural sources such as plants and animals. Her decision to study Pharmacy was driven by her love for Chemistry, Mathematics and Biology and the desire to find medicines for the many diseases around us. She inspires high school students to embrace Chemistry and Biology.

Dr. Purity Ngina holds a Ph.D. in Biomathematics from Strathmore University, Kenya. Purity is passonate about demystifying mathematics and inspiring girls to embrace STEM courses. She inspires students with her personal walk through life to beat the odds to succeed in her educational endeavours to become a celebrated student in Mathematics in the entire country at only 28 years of age.

Dr. Bathsheba Kerubo Menge holds a Doctoral degree in Applied Mathematics. She is specialized in Applied Mathematics and Computational Fluid Dynamics. She is a role model and mentor for Mathematics – linking the use of mathematics to real life situations.

Dr. Alix Dehayem is an accomplished Nuclear Physicist. She mentors students in Physics and its relevance to humanity – "Physics rules our daily lives and is elaborated in many actions that we perform and things that we use in our everyday life."

Prof. Faith Njoki Karanja is Chair of the Department of Geospatial and Space Technology, School of Engineering, University of Nairobi. She is the first woman to get a Phd in Geoinformation in Kenya and the first Associate Professor in the School of Engineering at Kenya's oldest University. She mentors with a focus to inspire more female students to embrace the engineering profession.

Eng. Amelia Omollo is an Aeronautical Engineer who has worked for Kenya Airways as a Project Manager for Boeing 777 and 787. She also served in the Kenyan Military as the first female aeronautical engineer where she aced her cadet course and was feted as the best cadet in military training, leadership and command. Her mentorship talks to the girls highlight the various obstacles that one is likely to encounter in a male dominated profession and how to overcome all these and be among the top performers in their profession. She emphasizes that the Engineering profession does not discriminate on the basis of one's gender, but it is people who do and particularly the society that sets the discriminatory rules that affect women.

Eng. Dr. Gladys Chepkirui Ngetich is a Kenyan engineer, and a Rhodes Scholar and a Schmidt Science Fellow. She has a doctorate degree in aerospace engineering from University of Oxford, in the UK. She is the recipient of the Tanenbaum Fellowship and the Babaroa Excellence Award. She is a postdoctoral researcher at Space Enabled at MIT under Schmidt Science Fellowship. She provides mentorship to female students on overcoming obstacles to become a most celebrated and youngest female PhD holder in Aerospace Engineering in Kenya.

Architect Mugure Njendu is a registered architect and urban planner. She is the founder of the Little Einsteins East Africa and the resident of the Architectural Association of Kenya. She mentors high school girls to see the link between science and art and their importance to sustainable development.

Anastasia Wanjohi is a geophysicist with over 10 years' experience in the energy sector having worked for Kenya Electricity Generating Company in the geothermal industry. She holds a Master of Science degree in Applied Geophysics and a post graduate diploma in Geothermal Geophysics from the United Nations University-Geothermal Training programme, in Iceland. She is among Kenya's few women geophysicists especially in the energy sector. She inspires students to connect with mother earth and see its beauty through the eyes of an Earth Scientist.

Dr. Dorothy Amwata is Rangeland Socio-ecologist. She holds a Ph.D. in Range Management (Resource Economics and Ecology). She mentors students to embrace Green economy, environmental management, and Agriculture for food security. She is currently the Coordinator of Career Services and Mentorship at South Eastern Kenya University (SEKU). Dr Amwata is passionate about mentorship for Girls in STEM and believes in giving girls an opportunity to believe in themselves, nurture their strengths and live their full life purpose.

Mrs. Nancy Wakarima Karigithu is Kenya's Principal Secretary for Maritime Affairs in the Ministry of Transport, Infrastructure & Urban Development. She is a maritime lawyer and founding Director-General of the Kenya Maritime Authority. She is a member of the Governing Council of the World Maritime University and serves as Vice President (Africa) for the International Maritime Satellite Organization. She inspires girls to see the importance of the Blue Economy for sustainable development and to take up the many opportunities therein.

Prof. Catherine Jane Ngila has a PhD in Chemistry (Analytical Chemistry) and is the current CEO of the African Academy of Sciences. She is a winner of the African Union's Kwame Nkrumah Award for Research. In 2021, she was recognized globally and declared one of five women researchers by the L'Oréal-UNESCO For Women in Science International Awards, representing Africa and Arab States. She is a role model and mentor to the girls in Chemistry and how to break the ceiling irrespective of one's background.

Ms. Pamela Osongo is an Electral Engineer with a Masters Degree in Electrical Engineering. She is a role model and mentor to high schools girls in electrical and telecommunication engineering.

Prof. Cecilia Moraa Onyango is an Associate professor of Horticulture with over 18 years experience in training, research and community outreach in the areas of crop production systems, postharvest handling of produce, standards and food safety. She has a PhD in Horticulture (crop Physiology and postharvest handling. She is a role model and mentor in Green Economy and Agriculture.

Dr. Alice Ochanda is a Programme Specialist at UNESCO Regional office for Eastern Africa and Coordinator of STEM Education. She initiated and coordinates the programme. She is a holder of a Doctorate Degree in Anthroplogy with a first degree in Education. She handles the Life and Survival skills component of the UNESCO/ GoK STEM Mentorship Programme. She believes in equiping girls with the skills to make informed career choices and empowering them to overcome the gender stereotypes that hinder their success.

Conclusions and Recommendations 6

6.1 Conclusions

The UNESCO/GoK STEM Mentorship Programme assessment had two main objectives: i. to show in the form of maps which regions and schools have participated in the programme since its inception in 2014 and ii. to assess the impact of the programme through the lenses of students who have transited to the tertiary institutions, students who were mentored but are still in school, the STEM teachers, the Head teachers, the Ministry of Education officials, the Institutions of Higher learning, the Private sector partners such as industries and the mentors. The main instrument used for the assessment was the questionnaire designed for each category.

For the GIS mapping, a general map showing the regions covered together with detailed maps for each of the eight regions in the country, namely: **Nairobi, Coast, Nyanza, South Rift, North Rift, Upper Eastern, Lower Eastern and Western** regions and the schools in each were generated. From the maps it is possible to visualize the geographic distribution of the programme coverage throughout the country. A total of 41 counties and 161 schools with a participation of over 2,000 girls were covered by the UNESCO/GoK STEM Mentorship camps since its inception in November 2014.

The analysis of the impact and attitude of all the actors revealed an overwhelming positive rating of the programme. For instance, majority of the students who transited to tertiary institutions indicated that the programme did influence their performance in STEM subjects and subsequent choice of STEM programmes at the tertiary institutions. The students still in school felt that the programme was an eye opener in terms of STEM subjects and opportunities which helped them change their attitudes thus leading to improved performance. STEM teachers who accompanied their students to the mentorship camps noted an improved performance in their respective STEM subjects. Overall, the Head Teachers also noted improved motivation and performance by both the students and teachers who had the opportunity to participate in the UNESCO/GoK STEM Mentorship Programme.

6.2 Recommendations

In line with the clarion call of the SDGs that no one should be left behind and considering that the UNESCO/GoK STEM Mentorship Programme targeted largely the disadvantaged girls in the rural schools, there was a general consensus that the programme needs to be upscaled in order to reach as many girls as possible in Kenya. This is evident from the GIS maps and the number of girls mentored. Although the programme has had a footprint in 41 out of 47 counties, the number of girls mentored remains low. One strategy that was proposed in order to increase participation is to get the buy - in and contribution of the county governments.

In terms of the choice of cohort to participate in the programme, there was a recommendation that all forms should be considered in the mentorship as opposed to focusing mainly on students from Forms One, Two and Three levels of education. Further,

the boys should also be considered in future STEM Mentorship Programmes.

Generally, from the assessment, it was evident that the UNESCO/GoK STEM Mentorship Programme had a positive impact by contributing to attitude change which lead to improved interest and performance in STEM subjects. The different respondents proposed some ideas that they felt would enhance the programme going forward. These included:-

- Expanding the scope of mentorship to include other STEM fields that may not be covered already, such as medicine, etc.
- Considering restructuring the programme to allow for adequate time for the sessions.
- Identifying more industrial and academic exposure for the students through formal partnerships. This would enable the schools to continue taking their students to visit the premises for exposure and learning purposes.
- Establishing a long-term mentor-student relationship for prosperity.
- Identifying a focal point in the schools to lead the Mentorship Programme.
- Employing social media and digital platforms for STEM activities.
- Giving teachers more responsibilities during the STEM Mentorship Camps.
- Developing a similar Mentorship programme for Science teachers to enable them improve on their pedagogical skills and understanding of gender equality issues
- Enhancing teachers skills in digital literacy to enable them use ICT to enhance teaching and learning of the STEM subjects.

Kenya STEM Education Policy Proposal

7

From the Assessment of the UNESCO/GoK STEM Mentorship Programme, key policy issues were identified. These revolved around three key areas namely, rationale, identification of priority areas and possible strategies that can be pursued to register advancement in STEM fields in the country.

a. Rationale for a STEM Education Policy for Kenya is anchored on the following facts:
   - The world is dynamic
   - There are many complex challenges as espoused in the SDGs
   - This would position Kenya in the Technology Arena
   - There are many global challenges that can only be addressed by STEM professionals, hence the need to train and equip young people with the necessary relevant skills in STEM.

b. Priority Areas to be addressed by the Kenya STEM Education Policy include:
   - Increased awareness on STEM among the Youth
   - Provision of an equal opportunity in the STEM programmes for All
   - Enhancement of importance of STEM in the Curriculum at all levels
   - Partnership for advancing STEM education in the country
   - Advancing student uptake of STEM fields in the country
   - Science Teacher Capacity Development
   - Improvement of infrastructure for research at University level and availability of laboratories for teaching STEM subjects – micro science kits for rural areas.

c. Strategies that can be deployed to realize the Kenya STEM education policy are namely to:
   - Give visibility to STEM education programmes at all levels of education and their importance in sustainable development
   - Provide adequate and appropriate STEM facilities through adequate funding for STEM education
   - Invest in capacity building for teachers to enhance teaching of STEM subjects
   - Improvement of infrastructure for research in STEM fields
   - Provision of incentives for best performing students in STEM subjects

The proposed Kenya STEM Education Policy must recognize Mentorship as an Enabler. There should therefore be provision for a National STEM Mentorship Programme at all levels as shown in figure 6.1.

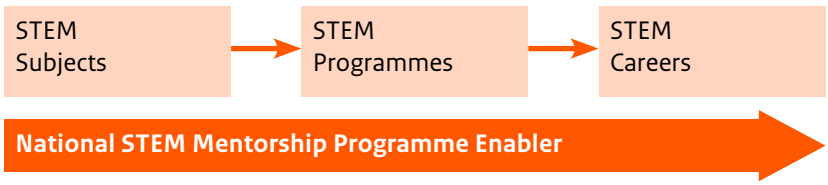

Figure 7.1: National STEM Mentorship at all Levels

References

English L D 2017 Advancing elementary and middle school STEM education International Journal of Science and Mathematics Education 15 5

Haggard, D. L., Dougherty, T. W., Turban, D. B., & Wilbanks, J. E. (2011). Who is a mentor? A review of evolving definitions and implications for research. *Journal of Management, 37,* 280- 304. doi:10.1177/0149206310386227

Kroll, J. (2016). What is meant by the term group mentoring? *Mentoring & Tutoring: Partnership in Learning, 24,* 44-58.

Montgomery B.L., 2017. Mapping a Mentoring Roadmap and Developing a Supportive Network for Strategic Career Advancement, *SAGE Open,* doi:10.1177/21582440177102 88

Siemens-stiftung https://www.siemens-stiftung.org/projects/design-thinking-in-stem/?_sft_working_areas=education&_sft_working_areas=education https://theindexproject.org/

THEDVOCATE 2019, 7 Benefits of STEM Education, https://www.theedadvocate.org/7-benefits-of-stem-education/ (Accessed on 15th September, 2020)

UNESCO 2017, 'Cracking the code' to end gender disparities in STEM: UNESCO Director-General opens global symposium, Bangkok, September, 2017

World Economic Forum, 2020

Stelter R.L., Kupersmidt J.B. and Stump K.N., 2020, Establishing effective STEM mentoring relationships through mentor training

https://doi.org/10.1111/nyas.14470

Annex A- UNESCO-GoK STEM Mentorship Programme Data

Annex A1: Summary of Students Mentored in the STEM Mentorship Programme

S/ No	Host School	Counties	Schools	Form	No. of Girls
1	St Georges Girls Nairobi	Kajiado	Kimuka Girls	2	2
			Kimana	-	2
			Noonkopir Girls	-	2
		Narok	Eor Ekule Girls	-	2
			Malelo	2,3	2
			Maasai Girls	-	-
		Nakuru	Bahati Girls	-	2
			Mary Mount Girls	-	2
			Naivasha Girls	-	3
		Laikipia	Gatero Girls	2	2
			St. Augustine	-	2
			St. Jude Girls	-	2
		Makueni	St. Joseph 'Girls	-	2
			Kisau Girls	-	-
			Mulala Girls	-	2
		Nairobi	Komarock School	2,3	3
			Highridge Secondary	-	3
			Karen C	2,3	3
			St. Georges	3	2
			Additional Girls from Host School		
Total					**38**
2	Moi Girls High School, Eldoret	Trans-Nzoia	Kwanza Girls	2,3	4
			St. Theresa Sec.	2,3	4
		Elegeyo Marakwet	Moi Kapsowar Girls	2,3	4
			Singore Girls	2,3	4
		Baringo	Kapropita Girls	2,3	4
			Pemwani Girls	2,3	4
		Uasin Gishu	Kapkoiga Girls	2,3	4
			Kipsangui Girls	2,3	4
			Moi Girls	2,3	10
		West Pokot	Nasakol Girls	2,3	4
			St. Cecilia Girls	2,3	4
		Nandi	St. Mary's Tachasis	2,3	4
			AIC Chebisaas Girls	2,3	4
			Additional Girls from Host School	4	285
Total					**343**

S/ No	Host School	Counties	Schools	Form	No. of Girls
3	Kisumu Girls	Kisumu	Kisumu Girls	1,2	4
			Nyakach Girls	1,2	4
			St. Barnabas Girls	1,2	4
			Additional Girls from Host School		
		Homa Bay	St. Francis Nyangajo	1,2	4
			Bishop Okullu Magare	-	4
		Nyamira	St. Paul's Nyandoche Ibere	1,2	4
			Kebabe Girls Sec.	1,2	4
		Siaya	Rambula Mixed Sec.	1,2	4
			Lieta Mixed Sec.	1,2	4
		Migori	Kadika Girls	1,2	4
			At. Albert's Ulanda	1,2	4
		Kisii	Itibo Girls	1,2	4
			Kereri Girls	1, 2	4
Total					**52**
4	Mama Ngina Girls High School	Mombasa	Mama Ngina Girls	2,3	33
			Mtongwe Girls	2,3	4
			Star of the Sea	2,3	4
		Kilifi	Bahari Girls	2,3	4
			Ngala Memorial Girls	1,2	10
			Kasidi Sec.	2,3	5
			Ganze Girls	2,3	5
		Kwale	Macknon Road Sec.	2,3	4
			Kwale Girls	2,3	4
		Tana River	Ndura Sec.	2,3	4
			Garsen Girls	2,3	4
			Madogo Sec.	-	4
			Mau Mau Sec.	-	4
		Taita Taveta	Bura Girls	2,3	5
			Mwakitawa Girls Sec.	2,3	5
			Eldoro Girls	2,3	5
			Mwangeka	2,3	5
		Lamu	Lamu Girls	2	3
			Bright Girls Shella	2,3	4
		Garissa	Dertu Girls	2,3	4
			Fafi Girls	2,3	4
Total					**124**

S/ No	Host School	Counties	Schools	Form	No. of Girls
5	Kaaga Girls High School	Meru	St. Angelas Girls	1,2,3	5
			Kaaga Girls	1,2,3	5
			Ntunene Girls	1,2,3	5
			Kibirichia Girls	1,2,3	5
			Gikurune Girls	1,2,3	5
			Additional Girls from Host School	4	100
		Embu	St. Annes Girls	1,2,3	5
			Kyeni Girls	1,2,3	5
			Kangaru Girls	1,2,3	5
			St. Bakhita Siakago	1,2,3	5
		Tharaka Nithi	Chuka Girls	1,2,3	5
			Mukothima Girls	1,2,3	5
			Muthambi Girls	1,2,3	5
			Marimanti Girls	1,2,3	5
		Isiolo	Waso Sec.	1,2,3	5
			Oldonyiro Sec.	1,2,3	5
			Bulesa Sec.	1,2,3	5
			Kinna Sec.	1,2,3	5
		Marsabit	Logo Logo Girls	1,2,3	5
			Moyale Girls	1,2,3	5
			Moi Girls	1,2,3	5
			Naikona Girls	1,2,3	5
		Wajir	Buna Girls	3,4	5
			Senior Ogle Girls	3,4	5
			Wajir Girls	3,4	5
			Hon Khalif	3,4	5
		Mandera	Moi Girls	1,2,3	5
			Khadija Girls	1,2,3	5
			Rhamu Girls	1,2,3	5
			Gololbia Girls	1,2,3	5
			Takaba Girls	1,2,3	5
Total					**250**

S/ No	Host School	Counties	Schools	Form	No. of Girls
6	Machakos Girls, High School	Machakos	Machakos Girls	1,2,3	8
			Masii Girls	1,2,3	8
			Matungulu Girls	1,2,3	8
			Matuu HGM	1,2,3	8
			St. Josephine Bakhita Masinga	1,2,3	8
		Kitui	St. Angela's Girls	1,2,3	8
			St. Mary's Mutito	1,2,3	8
			St. Bridgit Syomunyu	1,2,3	8
			Muthale Girls	1,2,3	8
		Makueni	Ukia Girls	1,2,3	8
			St.Josephs Girls	1,2,3	8
			Precious Blood Kilungu	1,2,3	8
			Mbooni Girls	1,2,3	8
		Kajiado	IIbisil Girls	1,2,3	8
			Baraka Oontoyie	1,2,3	8
			Rombo Girls	1,2,3	8
			Additional Girls from Host School		
Total					**128**
7	Mukumu Girls	Kakamega	Mukumi Girls	1,2,3	8
			Ikonyero Sec	1,2,3	8
			Sivile Sec.	1,2,3	8
			St. Joseph Nyorotis	1,2,3	8
			Holy Cross Emalindi	1,2,3	8
			Moi Girls Nangili	1,2,3	8
			St. Mary's Mumias	1,2,3	8
			Additional Girls from Host School	4	76
		Busia	Busili Girls	1,2,3	8
			St. Thomas Amagoro	1,2,3	8
			Our Lady of Mercy	1,2,3	8
			St. Anne Bunyala	1,2,3	8
			Busiada Girls	1,2,3	8
			St. Mary's Amukura	1,2,3	8
		Bungoma	Moi Girls Kamusinga	1,2,3	8
			Lugulu Girls	1,2,3	8
			Chwele Girls	1,2,3	8
			Cardinal Otunga Girls	1,2,3	8
			St. Cecelia Misikhu	1,2,3	8
		Vihiga	Ingidi Secondary	1,2,3	8
			Mbihi Girls	1,2,3	8
			Goibei Girls	1,2,3	8
			Mumbola Secondary	1,2,3	8
			Emanyinya Secondary	1,2,3	8
			Ikobero Girls	1,2,3	8
Total					**268**

S/ No	Host School	Counties	Schools	Form	No. of Girls
8	Moi Tea Girls Secondary School	Bomet	St. Benedict Kapkimolwo Sec.	1,2,3	9
			Ndarawetta Girls	1,2,3	9
			Moi Siongiroi Girls	1,2,3	9
			Saseta Girls	1,2,3	9
			Kaplong Girls	1,2,3	9
			Chebonei Girls	1,2,3	9
			Kamogoso Girls	1,2,3	8
			Maaset Sec.	1,2,3	8
		Nakuru	Langalanga Sec.	1,2,3	9
			Keriko Sec.	1,2,3	9
			Elburgon DEB	1,2,3	9
			Naivasha Girls	1,2,3	9
			Njenga Karume	1,2,3	9
		Narok	Kilgoris Girls	1,2,3	8
			Murkan Sec.	1,2,3	8
			Moi Naikarra	1,2,3	8
			Ole Tipis Girls	1,2,3	7
			Enkare Nairowua	1,2,3	8
		Kericho	Chelilis Girls	1,2,3	9
			Lesirwo Sec.	1,2,3	9
			Moi Kipsitet Girls	1,2,3	8
			Sosiot Girls Sec.	1,2,3	9
			Moi Tea	1,2,3	9
			Sacred Hill Girls	1,2,3	9
			Kipsigis Girls	1,2,3	9
			Additional Girls from Host School	1,2,3,4	58
Total					**274**
Grand Total					**1,485**

Annex A2: Summary of the Number of Counties, Schools and Students Mentored Since 2014 in the UNESCO/GoK STEM Mentorship Programme

Host School	Region	Year of Camp	Number of Counties	Number of Schools	Additional Number of Students from the Host School	Total Mentored
St. Georges Girls	Nairobi	November 2014	6	18	?	38
Moi Girls Eldoret	North Rift	April 2015	6	13	285	343
Kisumu Girls	Nyanza	November 2015	6	13	?	52
Mama Ngina Girls	Coast	April 2016	7	21	29	124
Kaaga Girls	Upper Eastern	April 2017	7	30	100	250
Machakos Girls	Lower Eastern	April 2018	4	17	?	136
Mukumu Girls	Western	April 2019	4	24	74	268
Moi Tea Girls	South Rift	April 2019	4	25	58	274
Grand Total			**43**	**161**	**161**	**1,485**

Annex A3: Model UNSECO/GoK STEM Mentorship Programme Schools Assessed

S/N	STEM Camp Year	County	School	Form	Total Number of Girls
1	November 2014	Nairobi	St. Georges	3	2
2	April 2015	Uasin Gishu	Moi Girls	2,3	10
3	April 2015	Baringo	Kapropita Girls	2,3	4
4	November 2015	Kisii	Kereri Girls	1,2	4
5	November 2015	Kisumu	Kisumu Girls	1,2	4
6	April 2016	Mombasa	Mama Ngina	2,3	33
7	April 2016	Kilifi	Bahari	2,3	10
8	April 2017	Meru	Kaaga Girls	1,2,3	5
9	April 2017	Embu	Kangaru Girls	1,2,3	5
10	April 2018	Machakos	Machakos Girls	1,2,3	8
11	April 2018	Makueni	Mbooni Girls	1,2,3	8
12	April 2019	Kakamega	St. Mary's Mumias	1,2,3	8
13	April 2019	Bungoma	Lugulu Girls	1,2,3	8
14	April 2019	Kericho	Moi Tea	1,2,3	9
15	April 2019	Nakuru	Keriko Sec	1,2,3	9

Annex A4: Randomly Selected Schools for STEM Mentorship Programme Assessment

S/N	STEM Camp Year	County	School	Number of School Sampled	Form	Total Number of Girls
1	Nov, 2014	• Kajiado	• Kimuka		2	2
		• Narok	• Malelo		2,3	2
		• Nakuru	• Mary Mount		2,3	2
			• Naivasha Girls		-	3
		• Laikipia	• Gatero Girls		2	2
		• Makueni	• St. Augustine		-	2
			• Mulala Girls		2	2
		• Nairobi	• Komarock		2,3	3
			• Karen C	9	2,3	3
2	Apr, 2015	• Trans Nzoia	• Kwanza Girls		2,3	4
		• Elegeyo Marakwet	• Singore Girls		2,3	4
		• Baringo	• Pemwani Girls		2,3	4
		• Uasin Gishu	• Kipsangui Girls		2,3	4
		• West Pokot	• St. Cecilia		2,3	4
		• Nandi	• AIC Chebisaas	6	2,3	4
3	Nov, 2015	• Kisumu	• St. Barnabas		1,2	4
		• Homa Bay	• Bishop Okullu		1,2	4
		• Nyamira	• Kebabe Girls		1,2	4
		• Siaya	• Rambula Mixed		1,2	4
		• Migori	• Kadika Girls		1,2	4
		• Kisii	• Itibo Girls	6	1,2	4
4	Apr, 2016	• Mombasa	• Star of the Sea		2,3	4
		• Kilifi	• Ngala Memorial		1,2	5
			• Ganze Girls		2,3	5
		• Kwale	• Kwale Girls		2,3	4
		• Tana River	• Garsen Girls		2,3	4
			• Mau Mau Sec		-	4
		• Taita Taveta	• Bura Girls		2,3	5
			• Eldoro Girls		2,3	5
		• Lamu	• Lamu Girls		2	3
			• Bright Girls		2,3	4
		• Garissa	• Fafi Girls	11	2,3	4

S/N	STEM Camp Year	County	School	Number of School Sampled	Form	Total Number of Girls
5	April, 2017	• Meru	• St. Angelas Girls		1,2,3	5
			• Gikurune Girls		1,2,3	5
		• Embu	• Kyeni Girls		1,2,3	5
			• St. Bakhita		1,2,3	5
		• Tharaka Nithi	• Chuka Girls		1,2,3	5
			• Muthambi Girls		1,2,3	5
		• Isiolo	• Waso Sec		1,2,3	5
			• Kinna Sec		1,2,3	5
		• Marsabit	• Moyale Grils		1,2,3	5
			• Maikona Girls		1,2,3	5
		• Wajir	• Senior Ogle Girls		1,2,3	5
			• Wajir Girls		1,2,3	5
		• Mandera	• Moi Girls		1,2,3	5
			• Khadija Girls		1,2,3	5
			• Takaba Girls	15	1,2,3	5
6	Apr, 2018	• Machakos	• Masii Girls		1,2,3	8
			• Matuu HGM		1,2,3	8
		• Kitui	• St. Mary's Mutito		1,2,3	8
			• Muthale Girls		1,2,3	8
		• Makueni	• St. Joseph Girls		1,2,3	8
			• Precious Blood Kilungu		1,2,3	8
		• Kajiado	• Rombo Girls		1,2,3	8
			• Noonkopir Girls	8	1,2,3	8
7	Apr, 2019	• Kakamega	• Moi Girls Nangili		1,2,3	8
			• Holy Cross Emalindi		1,2,3	8
			• Moi Girls Nangili		1,2,3	8
		• Busia	• St. Thomas Amagoro		1,2,3	8
			• Our Lady of Mercy		1,2,3	8
			• St. Ann Bunyala		1,2,3	8
		• Bungoma	• Moi Girls Kamusinga		1,2,3	8
			• Cardinal Otunga		1,2,3	8
			• Cardinal Otunga		1,2,3	8
		• Vihiga	• Mbihi Girls		1,2,3	8
			• Mumbola Sec		1,2,3	8
			• Ikobero Girls	12	1,2,3	8

S/N	STEM Camp Year	County	School	Number of School Sampled	Form	Total Number of Girls
8	Apr, 2019	• Bomet	• Ndarawetta Girls		1,2,3	9
			• Saseta Girls		1,2,3	9
			• Kaplong Girls		1,2,3	9
			• Kamogoso Girls		1,2,3	8
		• Nakuru	• Langalanga Sec.		1,2,3	9
			• Elburgon DEB		1,2,3	9
			• Njenga Karume		1,2,3	9
		• Narok	• Kilgoris Girls		1,2,3	8
			• Ole Tipis Girls		1,2,3	7
			• Enkare Nairowua		1,2,3	8
		• Kericho	• Sosiot Girls		1,2,3	9
			• Chelilis Girls		1,2,3	9
			• Kipsgis Girls	13	1,2,3	9
Total Number of Schools				**80**		

Annex A5: Summary of Teaching and Working Environments that participated in the STEM Mentorship Programme Since 2014

Host School	Year of Camp	Teaching Environment (Universities and Polytechnics)	Working Environment (Industries)
St. Georges Girls	November 2014	• University of Nairobi	• Bamburi Cement • Unilever Factory • Safaricom
Moi Girls Eldoret	April 2015	• Moi University • University of Eldoret	• Rift Valley Bottlers • Rivatex • KCC Eldoret • Safaricom
Kisumu Girls	November 2015	• Maseno University • RIAT	• Mabati Rolling Mill? • Muhoroni Sugar Mill • Safaricom
Mama Ngina Girls	April 2016	• Technical University of Mombasa	• Coast Bottlers • Safaricom • KMA
Kaaga Girls	April 2017	• Meru University • Meru Polytechnic	• Githongo Tea • Meru Flour Miller • Meru Diaries
Machakos Girls	April 2018	• Machakos University	• Golden Africa
Mukumu Girls	April 2019	• MMUST • Sigalagala Polytechnic	• Mudete Tea Factory • Western Sugar
Moi Tea Girls	April 2019	• University of Kabianga.	• KETEPA • Unilever Tea • Kericho Tea Research Institute • Chamngoi Tea

Annex B– Questionnaires

Annex B1: Questionnaire for Students in Tertiary Institutions

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Student Personal Details

Name: ..... Registration Number: .....

Name of the School: ..... County: .....

B: Student Academic Profile

1. Which year did you finish form four?
   - ☐ 2014
   - ☐ 2015
   - ☐ 2016
   - ☐ 2017
   - ☐ 2018
   - ☐ 2019

2. What was your mean grade?
   - ☐ A
   - ☐ A-
   - ☐ B+
   - ☐ B
   - ☐ B-
   - ☐ C+
   - ☐ C
   - ☐ C-
   - ☐ D+ and Below

C: Students Life after High School

1. After you finished form four what institution did you join?

Institution	Name
University	
TVET	
College (specify)	
Any other (specify)	

2. If at the University or College, what course are you pursuing?

Course	Name
Engineering Based	
Medical Based	
Agriculture	
Mathematics	
Computer Science and IT	
Physical Sciences Based	
Any Other	

D: Views on the STEM Activities

1. Did you participate in the STEM Mentorship Camp?

   Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did you participate in the STEM Mentorship Camp?
   - ☐ 2014
   - ☐ 2015
   - ☐ 2016
   - ☐ 2017
   - ☐ 2018
   - ☐ 2019

3. How would you generally rate the STEM Mentorship Programme?

   Rating: Very Good ☐ Good ☐ Fair ☐ Poor ☐ No Comment ☐

4. How would you rate the UNESCO/GoK STEM Activities?

Activity	Rating				
	Extremely Effective	Very Effective	Effective	Fairly Effective	Not Effective
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

5. What impact did each of the UNESCO/GoK STEM activities have on your attitude to STEM subjects?

Activity	Rating				
	Extremely Positive Impact	Very High Positive Impact	High Positive Impact	Fairly High Positive Impact	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

6. What impact did each of the STEM activities have on your subsequent performance on STEM subjects?

Activity	Rating				
	Extremely good performance	Very High Performance	High Performance	Fairly High Performance	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

7. What impact did each of the UNESCO/GoK STEM activities have on your choice of the programme you are currently pursuing at the University or College?

Activity	Rating				
	Extremely High Impact	Very High Impact	High Impact	Fairly High Impact	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

E: Do you intend to stay in the STEM field as a career?

Yes: ☐ No: ☐

If No, why? _____

F: Suggestions on improvements of the STEM programme

Give us any suggestions that would help improve future STEM programmes.

Suggestion

1. _____
2. _____
3. _____
4. _____
5. _____

Annex B2: Questionnaire for Students still in School

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Student Personal Details

Name: ..... (Optional) Registration Number: .....

Name of the School: ..... County: .....

B: Student Academic Profile

1. Which Form are you in now?
   - ☐ Form1
   - ☐ Form 2
   - ☐ Form 3
   - ☐ Form 4

2. What STEM subjects are you taking?
   - ☐ Physics
   - ☐ Chemistry
   - ☐ Biology
   - ☐ Arts and Design
   - ☐ Computer Studies
   - ☐ Any other (Specify) .....

3. What is your target grade?
   - ☐ A
   - ☐ A-
   - ☐ B+
   - ☐ B
   - ☐ B-
   - ☐ C+
   - ☐ C
   - ☐ Any Other

4. What did you score in your last exam?
   - ☐ A
   - ☐ A-
   - ☐ B+
   - ☐ B
   - ☐ B-
   - ☐ C+
   - ☐ C
   - ☐ Any Other

C: Views on the STEM Activities

1. Did you participate in the STEM Mentorship Camp?

   Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did you participate in the STEM Mentorship Camp?
   - ☐ 2014
   - ☐ 2015
   - ☐ 2016
   - ☐ 2017
   - ☐ 2018
   - ☐ 2019

3. How would you generally rate the STEM Mentorship Camp?

Rating: Very Good ☐ Good ☐ Fair ☐ Poor ☐ No Comment ☐

4. Have you ever mentored any of your fellow students in school or elsewhere?

   Yes: ☐ No: ☐

If yes how many? .....

If no why .....

5. How would you rate the STEM ACTIVITIES?

Activity	Rating				
	Extremely Effective	Very Effective	Effective	Fairly Effective	Not Effective
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

6. What impact did each of the STEM activities have on your attitude to STEM subjects?

Activity	Rating				
	Extremely Positive Impact	Very High Positive Impact	High Positive Impact	Fairly High Positive Impact	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

7. What impact did each of the STEM activities have on your subsequent performance on STEM subjects?

Activity	Rating				
	Extremely good performance	Very High Performance	High Performance	Fairly High Performance	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

8. How do you think each of the STEM activities will influence your choice of the programme to pursue at the University or College?

Activity	Rating				
	Extremely High Influence	Very High Influence	High Influence	Fairly High Influence	No Influence
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

E: Do you intend to pursue a STEM based career?

Yes: ☐ No: ☐

If Yes
Which STEM Career do you intend to pursue in future

Course	**Name**
Engineering Based	_____
Medical Based	_____
Agriculture	_____
Mathematics	_____
Computer Science and IT	_____
Physical Sciences Based	_____
Any Other	_____

F: Suggestions on improvements of the STEM programme

Give us any suggestions that would help improve future STEM programmes.
Suggestion

1. _____
2. _____
3. _____
4. _____
5. _____

Annex B3: Questionnaire for Teachers

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Teachers Personal Details

Name: ..... TSC Number: .....

Name of the School: ..... County: .....

B: Teachers Work Profile

1. Which Form(s) do you teach?
   - ☐ Form1
   - ☐ Form 2
   - ☐ Form 3
   - ☐ Form 4

2. What STEM subjects do you teach?
   - ☐ Mathematics
   - ☐ Physics
   - ☐ Chemistry
   - ☐ Biology
   - ☐ Any other (Specify) .....

3. In the STEM subjects that you teach what was your average mean grade last year?

Subject	Grade
Mathematics	_____
Physics	_____
Chemistry	_____
Biology	_____
Any Other	_____

C: Views on the STEM Activities

1. Did you participate in the STEM Mentorship Camp?

   Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did your school (students) participate in the STEM Mentorship Camp?
   - ☐ 2014
   - ☐ 2015
   - ☐ 2016
   - ☐ 2017
   - ☐ 2018
   - ☐ 2019

3. How would you generally rate the STEM Mentorship Camp?

   Rating: Very Good ☐ Good ☐ Fair ☐ Poor ☐ No Comment ☐

4. How would you rate the STEM Activities?

Activity	Rating				
	Extremely Effective	Very Effective	Effective	Fairly Effective	Not Effective
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

5. What impact did each of the STEM activities have on your attitude and skills for teaching STEM subjects?

Activity	Rating				
	Extremely Positive Impact	Very High Positive Impact	High Positive Impact	Fairly High Positive Impact	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

6. What impact did each of the STEM activities have on the subsequent performance of your students in STEM subjects?

Activity	Rating				
	Extremely good performance	Very High Performance	High Performance	Fairly High Performance	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

7. How would you rate the Teacher Mentorship Programme on STEM pedagogy in terms of relevance?

- ☐ Extremely relevant
- ☐ Very relevant
- ☐ Relevant
- ☐ Fairly Relevant
- ☐ Not Relevant

8. What impact did the Teacher Mentorship Programme on STEM pedagogy have on your approach to the teaching STEM subjects?

- ☐ Extremely Positive Impact
- ☐ Very High Positive Impact
- ☐ High Positive Impact
- ☐ Fairly High Positive Impact
- ☐ No Impact

9. What was the average mean grade after the STEM programme in your subject(s)

Subject	Grade
_____	A
_____	A-
_____	B+
_____	B
_____	B-
_____	C+
_____	C-
_____	C
_____	Any Other

E: Suggestions on improvements of the STEM programme

What could be done to make STEM Mentorship Programme benefit students more?

1. _____
2. _____
3. _____
4. _____
5. _____

Annex B4: Questionnaire for Head Teachers

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Head Teachers Personal Details

Name: ..... TSC Number: .....

Name of the School: ..... County: .....

B: Head Teachers School Profile

1. In what category is your school?
   - ☐ National
   - ☐ Extra County
   - ☐ County
   - ☐ Sub-County
   - ☐ Any other (Specify) .....

2. What type is your school?
   - ☐ Day
   - ☐ Boarding
   - ☐ Mixed day and boarding

3. Based on these two categories where would you classify your school?
   - ☐ All-Girls School
   - ☐ Mixed School

4. On average how has been the performance of the Students in the STEM Subjects?
   - ☐ Excellent
   - ☐ Very Good
   - ☐ Good
   - ☐ Average
   - ☐ Below Average

5. Before the STEM Camp what was the average mean grade for the STEM Subjects in your school?

Subject	Grade
Mathematics	_____
Physics	_____
Chemistry	_____
Biology	_____
Any Other	_____

C: Views on the STEM Activities

1. Did your school participate in the STEM Mentorship Camp?

   Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did your school participate in the STEM Mentorship Camp?
   - ☐ 2014
   - ☐ 2015
   - ☐ 2016
   - ☐ 2017
   - ☐ 2018
   - ☐ 2019

3. How would you generally rate the STEM Mentorship Camp?

   Rating: Very Good ☐ Good ☐ Fair ☐ Poor ☐ No Comment ☐

4. How would you rate the effectiveness of the STEM Mentorship Programme on the performance of your students and your school?

Target	Rating				
	Extremely Effective	Very Effective	Effective	Fairly Effective	Not Effective
Students					
School					

5. In your view what impact did each of the STEM activities have on the attitude of the students and the teachers?

Target	Rating				
	Extremely Positive Impact	Very High Positive Impact	High Positive Impact	Fairly High Positive Impact	No Impact
Students					
Teachers					

6. What impact did each of the STEM activities have on the subsequent performance of your students on STEM subjects?

Subjects	Rating				
	Extremely good performance	Very High Performance	High Performance	Fairly High Performance	No Impact
Mathematics					
Physics					
Chemistry					
Biology					
Any Other (Specify)					

7. What was the average mean grade after the STEM programme for your school?

Grade	Points
A	_____
A-	_____
B+	_____
B	_____
B-	_____
C+	_____
C	_____
C-	_____
Any Other (Specify)	_____

E: Suggestions on improvements of the STEM programme

Give us any suggestions that would help improve future STEM programmes.

Suggestion

1. _____
2. _____
3. _____
4. _____
5. _____

Annex B5: Questionnaire for Ministry Officials

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Official's Personal Details

Name: ..... Contact: .....

Institution: ..... County: .....

B: Officials Work Profile

1. How would you describe the focus of your work in relation to Secondary Schools?
   Supervision _____
   Policy _____
   Training _____
   Staffing _____
   Any Other (Specify) _____

2. What is your area of jurisdiction?
   - ☐ National
   - ☐ Extra County
   - ☐ County
   - ☐ Sub-County
   - ☐ Any other (Specify) .....

3. In your area of jurisdiction, how would you rate performance of Students in STEM subjects?
   - ☐ Excellent
   - ☐ Very Good
   - ☐ Good
   - ☐ Average
   - ☐ Below Average

C: Views on the STEM Activities

1. Have you had an opportunity to participate in any of the STEM Mentorship Camp?

   Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did you participate in the STEM Mentorship Camp?
   - ☐ 2014
   - ☐ 2015
   - ☐ 2016
   - ☐ 2017
   - ☐ 2018
   - ☐ 2019

3. How would you generally rate the UNESCO/GoK STEM Mentorship Programme?
   - ☐ Very Good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Comment

4. How would you rate the STEM Mentorship Activities on the Programme?

Activity	Rating				
	Extremely Effective	Very Effective	Effective	Fairly Effective	Not Effective
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

5. In your view, what would you say was the impact of each of the STEM activities on the attitude of the teachers and students in your area of jurisdiction?

Activity	Rating				
	Extremely Positive Impact	Very High Positive Impact	High Positive Impact	Fairly High Positive Impact	No Impact
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

6. What was the average mean grade after the STEM Mentorship Programme in your area of jurisdiction?

Grade	Points
A	_____
A-	_____
B+	_____
B	_____
B-	_____
C+	_____
C	_____
C-	_____
Any Other (Specify)	_____

7. Would you say that this STEM Mentorship Programme is ideal in inspiring secondary school students to take up sciences/STEM careers?

Yes: ☐ No: ☐

Explain .....

D: Suggestions on improvements of the STEM Mentorship Programme

Give us any suggestions that would help improve future STEM Mentorship Programmes.

Suggestion

1. _____
2. _____
3. _____
4. _____
5. _____

Annex B6: Questionnaire for Universities and Tertiary Institutions

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Staff's Personal Details

Name: ..... Contact: .....

Position: ..... Institution: ..... County: .....

B: Staffs Work Profile

1. How would you describe the focus of your work in relation to STEM Programmes in your institution?
   - ☐ Administration
   - ☐ Supervision
   - ☐ Teaching/Training
   - ☐ Research
   - ☐ Skills empowerment (Laboratory/Field)
   - ☐ Any other (Specify) .....

2. What is your level of operation?
   - ☐ Executive Management Level
   - ☐ College Level
   - ☐ Faculty/Institute/School
   - ☐ Department
   - ☐ Any other (Specify) .....

3. How would you describe your STEM programme of specialization?

Course	Name
Engineering Based	
Medical Based	
Agriculture	
Mathematics	
Computer Science and IT	
Physical Sciences Based	
Any Other	

4. What is the average enrollment in your STEM programme of specialization by gender?

Course	Name	Gender	
		M	F
Engineering Based			
Medical Based			
Agriculture			
Mathematics			
Computer Science and IT			
Physical Sciences Based			
Any Other			

5. How would you rate the performance on average of Female Students in the STEM related programme?
   - ☐ Excellent
   - ☐ Very Good
   - ☐ Good
   - ☐ Average
   - ☐ Below Average

C: Views on the STEM Activities

1. Have you had an opportunity to participate in any of the STEM Mentorship Camps?

   Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did you participate in the STEM Mentorship Camp?
   - ☐ 2014
   - ☐ 2015
   - ☐ 2016
   - ☐ 2017
   - ☐ 2018
   - ☐ 2019

3. What was your level of participation?
   - ☐ Key Note Address
   - ☐ General/Overview Address
   - ☐ Career Talks in STEM
   - ☐ Laboratory/Equipments Demonstration
   - ☐ Any other (Specify) .....

4. How would you generally rate the UNESCO/GoK STEM Mentorship Programme?
   - ☐ Very Good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Comment

5. How would you rate the STEM Mentorship Activities on the Programme?

Activity	Rating				
	Extremely Effective	Very Effective	Effective	Fairly Effective	Not Effective
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

5. In your view, what would you say was the impact of the STEM programme on the enrollment of Female Students into the STEM programmes in your institution?

☐ Extremely Positive Impact
☐ Very High Positive Impact
☐ High Positive Impact
☐ Fairly High Positive Impact
☐ No Impact

6. How would you compare the number of enrollment of Female Students before and after the STEM Mentorship Programme in your respective STEM programme?

Year of STEM Mentorship _____

Programme _____

Before STEM Mentorship Programme _____

After STEM Mentorship Programme _____

7. Would you say that this STEM Mentorship Programme has contributed to increase in enrollment of Female Students in STEM Programmes?

Yes: ☐ No: ☐

Explain _____

E: Suggestions on improvements of the STEM Mentorship Programme

Give us any suggestions that would help improve future STEM Mentorship Programmes.

Suggestion

1. _____
2. _____
3. _____
4. _____
5. _____

Annex B7: Questionnaire for Industries

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Personal Details

Name: ..... Contact: .....

Position: ..... Institution: ..... County: .....

B: Work Profile

1. How would you describe the focus of your work?
   - ☐ Management
   - ☐ Supervision
   - ☐ Policy
   - ☐ Training
   - ☐ Operations
   - ☐ Any other (Specify) .....

2. How would you describe your industry/institution with respect to application of STEM knowledge and skills?
   - ☐ Purely STEM
   - ☐ Partially STEM
   - ☐ None-STEM
   - ☐ Any other (Specify) .....

3. How would you compare the personnel in your industry/institution in terms of STEM specialization?

   % STEM Specialists _____

   % NON-STEM Specialists _____

4. What is the level of qualification of the key staff in your industry/institution with respect to STEM career specialization?

Level **Qualification/s**

Managers _____

Supervisors _____

Research and Development _____

Trainers _____

Operators _____

Any Other (Specify) _____

5. What is the gender distribution of the key personnel in your industry/institution with respect to STEM career specialization?

Level	Gender	
	M	F
Managers		
Supervisors		
Research and Development		
Trainers		
Operators		
Any Other (Specify)		

6. Explain generally the work performance with respect to gender at various levels?

Level	Outstanding		Satisfactory		Average		Below Average		No Comment	
	M	F	M	F	M	F	M	F	M	F
Managers										
Supervisors										
Research and Development										
Trainers										
Operators										
Any Other (Specify)										

C: Views on the STEM Activities

1. Have you had an opportunity to participate in any of the STEM Mentorship Camps?

Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did you participate in the STEM Mentorship Camp?

☐ 2014
☐ 2015
☐ 2016
☐ 2017
☐ 2018
☐ 2019

3. How would you generally rate the UNESCO/GoK STEM Mentorship Programme?

   Rating: Very Good ☐ Good ☐ Fair ☐ Poor ☐ No Comment ☐

4. How would you rate the STEM Mentorship Activities on the Programme?

Activity	Rating				
	Extremely Effective	**Very Effective**	**Effective**	**Fairly Effective**	**Not Effective**
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

5. In your view, how would you rate the impact of exposure of students in the industry with regard to choosing a STEM career?
   - ☐ Extremely Positive Impact
   - ☐ Very High Positive Impact
   - ☐ High Positive Impact
   - ☐ FFairly High Positive Impact
   - ☐ No Impact

6. Would you say that this STEM Mentorship Programme is ideal in inspiring secondary school girls to take up sciences/STEM careers?

   Yes: ☐ No: ☐

Explain _____

E: Suggestions on improvements of the STEM Mentorship Programme

Give us any suggestions that would help improve future STEM Mentorship Programmes.

Suggestion

1. _____
2. _____
3. _____
4. _____
5. _____

Annex B8: Questionnaire for Mentors

An Assessment to Document the impact of the UNESCO/MoE/KNATCOM/NACOSTI STEM Mentorship Programme for Girls in Kenya

Purpose: The main objective of the assessment is to determine the impact of the UNESCO/GoK STEM Mentorship Programme in Kenya with a view to providing important information for policy making for advancement of STEM Education in the country and in the region, while also proposing tangible measures for improvement and policy advice.

All the responses given will be handled with utmost confidentiality and will only be used solely for the objectives of the study in improving STEM Education in Kenyan and beyond.

A: Personal Details

Name: ..... Contact: .....

Position: ..... Institution: ..... County: .....

B: Work Profile

1. How would you describe the focus of your work?
   - ☐ Management
   - ☐ Research
   - ☐ Policy
   - ☐ Training
   - ☐ Operations
   - ☐ Any other (Specify) .....

2. How would you describe your institution with respect to application of STEM knowledge and skills?
   - ☐ Purely STEM
   - ☐ Partially STEM
   - ☐ None-STEM
   - ☐ Any other (Specify) .....

3. How would you compare the personnel in your institution in terms of STEM specialization?

   % STEM Specialists _____

   % NON-STEM Specialists _____

4. What is the level of qualification of the key staff in your institution with respect to STEM career specialization?

Level **Qualification/s**

Managers _____

Supervisors _____

Research and Development _____

Trainers _____

Operators _____

Any Other (Specify) _____

5. What is the gender distribution of the key personnel in your institution with respect to STEM career specialization?

Level	Gender	
	M	F
Managers		
Supervisors		
Research and Development		
Trainers		
Operators		
Any Other (Specify)		

C: Views on the STEM Activities

1. Have you had an opportunity to participate in any of the UNESCO/GoK STEM Mentorship Camps?

   Yes: ☐ No: ☐

If yes proceed to question 2

2. Which year did you participate in the UNESCO/GoK STEM Mentorship Camp?

   ☐ 2014
   ☐ 2015
   ☐ 2016
   ☐ 2017
   ☐ 2018
   ☐ 2019

3. What STEM activity did you participate in?

Activity	Activity Participated in	Specify the activity and the role
Life and Survival Skills Talk		
Making Career Choices in STEM		
Talks on STEM Programs		
Visit to the Learning Environment		
Visit to the Industry		
Coding		
Innovative Problem-Solving Skills		

4. How would you generally rate the UNESCO/GoK STEM Mentorship Programme?

Rating: Very Good ☐ Good ☐ Fair ☐ Poor ☐ No Comment ☐

5. How would you rate the UNESCO/GoK STEM Mentorship Activities on the Programme?

Activity	Rating				
	Extremely Effective	Very Effective	Effective	Fairly Effective	Not Effective
Life and Survival Skills Talk					
Making Career Choices in STEM					
Talks on STEM Programmes					
Visit to the Learning Environment					
Visit to the Industry					
Coding					
Innovative Problem Solving Skills					

6. In your view, how would you rate the impact of mentoring with regard to choosing a STEM career?

Rating

☐ Extremely Positive Impact
☐ Very High
☐ Positive Impact
☐ High Positive Impact
☐ Fairly High Positive Impact
☐ No Impact

7. Would you say that the UNESCO/GoK STEM Mentorship Programme is ideal in inspiring secondary school girls to take up sciences/STEM careers?

Yes: ☐ No: ☐

Explain _____

E: Suggestions on improvements of the UNESCO/GoK STEM Mentorship Programme

Give us any suggestions that would help improve future UNESCO/GoK STEM Mentorship Programmes.

Suggestion

1. _____
2. _____
3. _____
4. _____
5. _____

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