



EFFECTIVENESS OF PRINCIPALS IN MITIGATION OF CLIMATE CHANGE IN MIXED DAY SECONDARY SCHOOLS IN RARIEDA SUB-COUNTY, KENYA

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Abstract:

Climate change is a natural process where temperature, rainfall, wind and other elements of weather vary over decades or more. It has negative effects such as global warming and excessive rain leading to flooding that affects individuals and schools. Principals, as community change agents and being in charge of people, are expected by the Teachers Service Commission (TSC) to participate in national climate change mitigation efforts through mobilizing teachers, students, and parents to grow trees in their school localities. This is because grown trees create a micro-climate that favour a myriad of vital human activities which are currently threatened by climate change effects. Effects of climate change such as global warming, floods and landslides affect schools' programs, hence becoming an administrative issue for principals. For example, on 3rd May, 2024, schools' reopening for the second term was postponed indefinitely due to floods. The principals' role in mitigating climate change is crucial. This can be done through tree growing, growing flowers, and proper waste management alongside other environment conservation activities. In Rarieda Sub County (SC), the effects of climate change have been observed in terms of drought, famine, high temperatures and scarcity of water, making most schools source water from far places. The Global Forest Watch (2023) revealed that in 2010, Rarieda SC had a tree cover of 3.1 %, which was reduced by 615 million hectares (Mha) by 2022, against the Siaya County average at 11.0%, both being lower than the national average at 12.3%. The problem is that Rarieda SC has the lowest tree cover in Siaya county which is also declining at the highest rate. Therefore, the purpose of the study is to examine the effectiveness of principals in mitigation of climate change in mixed-day secondary schools in Rarieda SC. The effectiveness of the principals is evidenced by the level of engagement of teachers, students and parents in tree growing that results in an increase in tree cover. The objectives of the study are to establish the level of principals' engagement of students in tree growing for climate change mitigation

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in mixed day secondary schools in Rarieda SC, to determine the level of principals' engagement of teachers in tree growing for climate change mitigation and to determine the level of principals' engagement of parents in tree growing for climate change mitigation in mixed day secondary schools in Rarieda SC. The study is anchored on the Gallup model of employee engagement (Gill, 2009). The tenets of the model are empowerment, enablement and connection. The research design is a descriptive survey. The population of the study is 35 principals of mixed day secondary schools, 575 teachers, 4513 students and 35 parents. The study used census sampling to select the schools and principals. Oso and Onen's table was used to select the number of students to participate in the study. Saturated sampling was used to select the SCQASO. The validity of the instruments was subjected to scrutiny by experts at the School of Education. Internal consistency reliability was used to ensure the reliability of the data. Data collection was done using questionnaires and interview schedules. Data analysis was done using descriptive statistics. The findings showed low principal engagement of students, teachers and parents in tree-growing activities in mixed-day secondary schools in Rarieda Sub-county, with mean scores of 1.549 for students, 1.4396 for teachers, 2.025 for principals and 1.33 for parents.

Keywords: climate change; tree growing; climate change mitigation; tree cover; mitigation effort; students' engagement; teachers' engagement; parents' engagement; greenhouse gases; education; secondary schools

1. Introduction

1.1 Background of Study

The effects of climate change have been felt across the country. Of the many possible causes, the effects of greenhouse gases have been cited frequently. Natural control of greenhouse gases through photosynthesis is a major mitigation effect. Trees provide leaves and green stems where photosynthesis takes place. Tree cover may have a significant effect on the presence of greenhouse gases in the atmosphere.

The school principal is the general manager and director of all activities of a secondary school in Kenya. The Ministry of Education (1987) states in its Secondary Schools Heads Manual that it is his/her duty to run and control the school in general. The principal has the role of planning, organisation, directing, controlling, staffing, innovating, coordinating, motivating and actualising the educational objectives of the institution and the country, although most of the functions may be delegated by the principal (Ministry of Education, 1987). Performance contracting was introduced by the Teachers Service Commission (TSC), which deals with the teacher management functions on behalf of the government, as a method of ensuring efficient service delivery. The Principal signs a performance contract each passing year. Part F4 of the performance contract is concerned with safety and security measures. The leader is expected to establish measures to counter the technological and environmental risks, terrorism and

radicalisation, fire, natural disasters, etc. On 2nd October, 2023, the TSC issued a circular requiring the promotion of the culture of planting trees among all principals. This is to be in a proportion of 30 per cent fruit trees and 70 per cent other trees. They will do this through the implementation of strategy (a) identification of public spaces and areas where trees can be planted, and (b) mobilization, coordination, oversight, and supervision of tree planting in specific administrative areas. The principals will be expected to mobilize employees below them to take part in the growing of trees. The purpose of tree growing is hence incorporated in the performance contract (TSC, 2023). Principals, thus, can play a role in putting the government policy into place by planting 9,000,000 trees to cover more of the school and its surrounding area to counter climate change. The measure applied in the directive above is a determining factor in the effectiveness of the principals in mitigation efforts concerning climate change. Some of the negative impacts of climate change include erratic weather patterns, including global warming and excessive rains, which cause flooding that affects people and schools.

The gazette announcement No. 15238, of 6th November, 2023, in The Kenya Gazette Vol. CXXV No. 238, declared Monday, 13th November, 2023, a public holiday, National Tree Growing Day, and asked the populace to take part in tree growing nationwide. The exercise was an element of Kenya's landscape and ecosystem restoration program in an effort to grow fifteen billion trees. (The Republic of Kenya, 2023). The individual tree that is counted is known as tree cover.

Climate change is a natural process whereby the temperature, rain, wind, among others, change over decades or more. Riedi (2016) defines Climate Change as either an average or climate variability change that lasts over a long period. Amplification of greenhouse gases in the atmosphere, like carbon dioxide and methane, is among the major causes of climate change, which contributes to global warming. The growing level of greenhouse gases emitted by human activity are close to being a blanket that covers the earth trapping the heat of the sun and increase temperatures. Human activities like the burning of fossil fuels, gasoline to propel a car or coal to heat a building, also increase greenhouse gases. Climate change has brought about effects such as extreme droughts, water shortages, extreme fires, increased sea levels, floods, devastating tempests and biodiversity reduction, among others. It has brought about erratic weather patterns. The effects of global warming are documented in major portion of the globe. These have contributed to a reduction in average rainfall, drought or famine in various locations.

Nairobi Declaration on Climate Change was done on Wednesday, 6th September, 2023, at the Kenyatta International Convention Centre (KICC) in Nairobi, Kenya. This marked the end of the Africa Climate Summit, which took place between 4th and 6th September, 2023. Heads of state and heads of government of Africa were present in it, and a large number of delegates interested in climate change attended from all over the world. Among the resolutions were reforms of finance to aid African Countries in combating climate change by, e.g. enlarging carbon sinks (The Standard, 7th September, 2023).

COP24 was the 24th conference of the parties to the United Nations Framework Convention on Climate Change that took place in Katowice, Poland, between 2nd and 14th December 2018. It convened experts and influencers spearheading the implementation of the Sustainable Development Goals related to climate change across the globe in a series of high-level meetings on how the two are interrelated with the Vision 2030 agenda. The themes covered were the interconnections between climate and energy, food production, forests, our oceans and many others (UN, 2018). From 31 October -13 November 2021, the 26th UN Climate Change Conference of the Parties (COP26) took place in Glasgow, UK. COP26 reached the agreement of the Glasgow Climate Pact. The measures to be implemented throughout the world consisted of mitigation (cutting emissions), adaptation (assisting those already affected by climate change), finance (empowering countries to implement even more action) and collaboration (collaborating to execute even more action) (UN, 2021).

When trees are involved in photosynthesis, they absorb carbon dioxide. Photosynthesis is a chemical reaction during which photosynthetic plants produce oxygen and energy in the form of sugar by the use of sunlight, water and carbon dioxide. The Arbor Day Foundation has it that a mature tree will capture over 48 pounds (21.77 kilograms) of carbon dioxide in the air and emit oxygen in its place in just a single year. (Stancil, 2015). Reduction of forest cover that occurs due to deforestation adds to the growth of greenhouse gases. The most likely solution to this is growing trees. A school set-up has a better position to mobilise the stakeholders of the school to grow trees. It can be implemented in the curriculum in a course like agriculture, a club activity or a community drive. When stakeholders are involved by the principal of a school, more hands are made available to the process or activity (Bourne, 2022). There is a wide range of policies and initiatives of the European Union (EU) which are relevant to forests. Over a few decades, the functions of environmental forests have gained more and more interest in the background of climatic change, effects and energy policies. There is growing appreciation of forests with regard to their environmental functions and as recreational facilities. By 2020, the EU had estimated 160 million hectares of forests, and it is thus that forest occupied 39% of the EU land area (Eurostat, 2023). As Kenyans, we should follow the culture of paying attention to environmental forest functions. Schools in Kenya are supposed to participate in the planting of trees to curb climatic damage. The Kenyan government has established several interventions and programs to facilitate the growing of trees. The Ministry of Education (MOE) embedded the practice of tree growing as a performance contract among principals of secondary schools. In Kenya, the performance contract (PC) is signed by every principal annually, with Section F4 being about safety and security measures. In this, the principal is supposed to establish mechanisms to counter technological and environmental risks and natural calamities. Besides this, TSC sent to all principals on 2nd of October, 2023, a circular regarding the implementation of the presidential directive regarding the national tree growing and restoration campaign, Circular No: 17/2023 (TSC, 2023). This circular was issued as a result of a government-issued circular, Circular No. OP/CAB/17A dated 30th January, 2023 (Republic of Kenya,

2023). The government circular instructed all the ministries, departments, and agencies to include the target of planting trees within the Financial Year (FY) 2023-2024. TSC would need to mobilise the resources to plant at least 9,000,000 trees by the end of the financial year 2023-2024, which would be achieved by the use of all employees in administrative positions at various levels to work with state and non-state agencies. The circular further advised that henceforth, planting of trees would be incorporated within the performance contract structure of the commission to take care of monitoring and reporting. Ministry of Environment, Climate Change and Forestry called upon Kenyans to adopt the habit of nurturing tree seedlings to grow instead of just planting trees and letting them fend for themselves. This involved school concentration on the cultivation of trees (Republic of Kenya, 2023).

The role of the principal in mitigating climate change by encouraging teachers to grow trees is the best, as the teachers will be dealing with the other stakeholders on a broader scale, and the propagation of the idea can have fruits very quickly (Just One Tree, 2023). As illustrated in a two-streamed school of twenty teachers and four hundred students, where a principal involves the twenty teachers, and they positively embrace it, the information will reach the four hundred students and eight hundred parents, assuming that each student has two parents and ultimately the whole school and surrounding community. In a research conducted on the influence of employee engagement on the performance of teachers in secondary schools in Machakos County, there was a positive relationship between teacher performance and employee engagement in decision-making. On the same note, a study by Were (2017) on influence of employee engagement practices on teacher performance in Ndhiwa Sub County, which is a public secondary school, concluded that there was a strong correlation (0.923 and a p-value of 0.5) between employee engagement through professional development, workplace communication, reward system and teacher performance. Kilonzo (2018) addressed the involvement of teachers in the decision-making process in administration in Machakos. The success of the engagement that is introduced will be related to the current study, that canters on the practical activity of mitigating climate change by growing trees, as proposed by principal engagement of teachers. Besides, Were (2017) has concentrated on professional development, workplace communication and reward in the context of teacher engagement. The main participation in the present study is by involving the teachers in growing trees to combat climate change.

A research on the correlation between engagement of student and student retention at Moi University found that active collaborative learning, student-faculty interaction and a conducive campus environment has a predominant effect on student retention (Ndege, 2010). Based on this approach, one can involve students and retain them in a scheduled program, such as taking part in the curriculum activities to the completion of the course. The study carried out by Ndege was based on a theoretical report on the participation of students in the activities whereas the current research will be based on actual participation. It will use a descriptive research design, unlike the historical research design in the analysis carried out by Ndege. Engagement of the subject

teachers through active participation of the students in collaborative practices over 4 years in Kirinyaga County resulted in improved KCSE performance. This was motivated by research by Irungu (2019) on the influence of principals' collaborative practices on students' performance in secondary schools in Murang'a and Kirinyaga Counties. In the present research, the interest is in student engagement by the principals in tree-growing activities to achieve climate change mitigation.

A research was carried out to find out the connection between academic engagement and academic achievement of Form One students at Dadaab Refugee Camp, Kenya. The analysis was based on social cognitive learning as put forth by Albert Bandura. The researcher used a correlational design in order to examine and analyse the two variables. The research was done on four public schools in the refugee camp that were public. Surum (2018) cites Bandura (1986), who argued that learning is an outcome of reciprocal causation or determination, which is one of the fundamental principles of learning. This means that there is an interaction of various factors in learning, which include behaviour, environment, memory storage of information and personal factors. The research came to the conclusion that the level of academic engagement is strongly related to the performance of the student in the classroom, Surum (2018). When the parents show interest, the task to be accomplished has a fair amount of success (CDC, 2018), and the parents are more crucial to school activities and growth in particular. Their first reason is that they are the financiers, and secondly, they are numerous. In an ideal situation, each student in the school has two parents. Whatever they have consumed positively will be broadcast to their circles back home. Centers for Disease Control and Prevention (CDC) indicate that parental involvement in school is directly related to improved student behaviour, improved academic performance and improved social skills. (CDC, 2018). This thus means that it is possible to involve parents through the school authorities to get certain objectives realized. In this respect, a research on parental participation in the implementation of Competency-Based Education in Kenya reported that parents recognize the significance of cooperation in their homes that motivates them to participate in the implementation process (Mwarari, 2020). Parental engagement and community service learning are both promoted under competency-based education. This study will deal with tree growing as a co-curriculum activity as opposed to the school academic activity as in Mwarari (2020). Mwarari never imagined the interaction with other stakeholders via participation in a co-curriculum activity. Climate change has contributed to the occurrence of prolonged drought, unpredictable weather patterns, flooding, among others. Greenhouse gases increase in the atmosphere is the major contributor to climate change. Trees control the impact of climate change through absorption of the Carbon dioxide in the atmosphere. Having more trees decreases instances of greenhouse gases, thus decrease climate change. In the studies cited above, none has focused on the engagement of stakeholders in the education sector in out-of-class administrative obligations of environmental conservation through tree growing.

Table 1.1 shows the % tree cover of Siaya County sub-counties (Global Forest Watch, 2023).

Table 1.1: Tree cover in Siaya County: 2010

Location	Tree Cover	Acreage
Kenya	12.3	3.18hMha
Siaya County	11.0	37.0kha
Gem Sub County	18.0	7.22ha
Ugenya Sub County	12.0	3.69ha
Ugunja Sub County	7.1	1.51
Alego Sub County	18.0	10.90
Bondo Sub County	9.0	11.60
Rarieda Sub County	3.1	2.11

Source: Global Forest Watch (2023).

In Table 1.1 above, the coverage of trees in our country remains very low, at 12.3 and may decrease because of the old age of trees, natural calamities, and socio-economic development activities by human beings, including lumbering and habitation to build houses and farmlands. Global Forest Watch has documented that the level of tree cover has been cut down significantly since the year 2010, thus exacerbating the impact of climate change in the country. The lowest percentage of tree cover was found in Rarieda Sub-County that had 3.1% tree cover and a Kha of 2.11, compared to the county average of 11.0 with a kha of 37. Also, as indicated in Table 1.2, 615 Mha of Rarieda Sub-county had been lost between 2010 and 2022, making the situation of the tree cover more dire. This compares to Ugunja Sub-county that recorded the second-biggest loss of 462 Mha in 2022, from 7.1% tree cover in 2010.

Table 1.2: Hectares of tree cover lost in the period of 2010-2022.

Hectares of tree cover lost between 2010 and 2022

SN	Subcounty	Hectares Lost
1	Rarieda	615 Mha
2	Ugunja	462 Mha
3	Ugenya	154 Mha
4	Bondo	106 Ha
5	Alego	73.3 Ha
6	Gem	8.08 Ha

Source: Global Forest Watch (2023).

Global Forest Watch is an online site that offers information and mechanisms used in the monitoring of forests. The World Resources Institute (WRI) initiated it in 1997. It is headquartered in Washington DC, United States of America (USA). In the recent past, forest cover has been dwindling (Global Forest Watch, 2023). The table above indicates that between 2010 and 2022, the sub-counties in Siaya had lost several hectares of tree cover. According to the table, Rarieda has lost the largest area of 615Mha (Table 1.2). There is necessity to pay attention to Rarieda, as it has lost the biggest area, and its tree cover of trees was just 3.1%, as observed in Table 1.1. Thus, this study aims at establishing how effective the principals are in reducing climate change in mixed-day secondary schools in Rarieda Sub-County. As an administrator, the principal has a role in the provision of a conducive learning environment. Climate change effects like floods

interfere with learning. Planting trees is one of the ways of reducing climatic change. The present work is concerned with increasing tree cover by planting trees to alleviate climate change and, therefore, minimize the undesirable impacts like flooding. The impact of floods on schools was extremely high in the months of April and May 2024, such that the Ministry of Education had to delay the reopening of schools indefinitely on 3rd May, 2024.

1.2 Statement of the Problem

The Global Forest Watch (2023) states that the tree cover of Kenya is 12.3%. There is a tree cover of 11.0 per cent in Siaya as a county. Rarieda SC has the lowest percentage of tree cover, at 3.1. It can also be noted that over the period of 2010- 2022, Rarieda lost 615 mega hectares (Mha) of tree cover, the greatest loss out of the entire Siaya County sub-counties hence aggravating the adverse effects of climate change. This stands out relative to Gem Sub-county that had lost 7.22 Kilo hectares (Kha) of 18% tree cover at its initial state, and Ugunja Sub-county, which had 18% tree cover in 2010 and 7.1% tree cover in 2022. The trend in Rarieda is a cause for concern, because it had the lowest tree cover, and the loss of tree cover acreage was the highest between 2010 and 2022.

The government policymakers and policy practitioners in Kenya have now focused on the growing of trees as a climate change mitigation activity. It is in this aspect that the school principal, who is an authority in the school community and an opinion shaper at grass root level around the community, has been noted to be an important party in promoting climate change mitigation-related objectives through the involvement of teachers, students and parents. This is to be done by involving those under his control in the school support system in tree growing to mitigate climate change, by identifying any available spaces to plant trees, and mobilizing the personnel to achieve the objective, according to TSC circular No. 17/2023. To promote the national tree cover, the government anticipates that all its departments should promote tree growing. Herein lies the point that principals of the mixed-day secondary schools who will be representing the Ministry of Education should involve the stakeholders, who are the teachers, the students, as well as the parents. The stakeholders in such schools work at the grassroots community level, and therefore it means that the activities they engage in directly affect the locality surrounding it to boost the number of trees to mitigate climate change. As anticipated by TSC, when secondary school principals in mixed-day secondary schools participate in growing trees by involving teachers, students, and parents who, by themselves, interact in school, their homes and in different areas of the school surrounding the village, efforts towards the government goal of achieving an extra 9,000,000 trees would be achieved. This would be made up of 30 per cent fruit trees and 70 per cent other trees. Out of school, teachers, students and parents socialize with the rest of the community such as their neighbours, relatives, friends and family. The dissemination of information received by one day school teacher, student and parent, is likely to reach a very large number of individuals in their socio-economic environment within a short period of time; hence, it would be useful to the government initiative of maximizing tree growing as a solution to climate change. Climate Change effects like

flooding would result in school closures, causing learning disruption. A school that has a disrupted learning is one of the biggest administrative issues for the principal. Learning disruption is unhelpful in syllabus coverage and other school programs. Sometimes it causes annihilation of classrooms and other learning institutions. The growth of trees enhances tree cover that alleviates climate change.

1.3 Purpose of Study

The purpose of this study is to examine the effectiveness of principals in mitigation of climate change in mixed-day secondary schools in Rarieda Sub-County, Kenya.

1.4 Objectives of the Study

This research aims at the following objectives:

- 1) To establish the **effectiveness** of principals in engagement of student in tree growing for climate change mitigation efforts in mixed-day secondary schools in Rarieda Sub-County.
- 2) To establish the **effectiveness** of principals in engagement of teachers in tree growing for climate change mitigation efforts in mixed-day secondary schools in Rarieda Sub-County.
- 3) To establish the **effectiveness** of principals in engagement of parents in tree growing for climate change mitigation efforts in mixed-day secondary schools in Rarieda Sub-County.

1.5 Research Questions

The following are the research questions:

- 1) What is the level of effectiveness of the principals' engagement of students in tree growing in mixed-day secondary schools in Rarieda Sub-county?
- 2) What is the level of effectiveness of the principals' engagement of teachers in tree growing in mixed day secondary schools in Rarieda Sub-county?
- 3) What is the level of effectiveness of the principals' engagement of parents in tree growing in mixed day secondary schools in Rarieda Sub-county?

1.6 Scope of Study

- 1) The study will be done within Rarieda Sub-County, Siaya County and hence its results will only be generalised to Rarieda Sub-County.
- 2) The study took into account tree growing as a measure of climate change mitigation.

1.7 Limitations of the Study

The limitations which may be experienced in the study include;

- 1) Determining an appropriate time to collect data from, the respondents. The timetable in school is fixed, and there are minimal breaks in the schedules of most schools. The respondents may not have sufficient time to give information.

- 2) The obtained data will be used to derive the results, which will be based on data provided by the respondents, and some might be reluctant to provide the response, fearing he/she may be reported to the Ministry of Education or TSC.
- 3) The analysis will be based on the data that the respondents give, and not all other factors that influence climatic conditions may be acquired.

1.8 Assumptions of the Study

- 1) The principals are motivated to participate in tree-growing programs.
- 2) The principal can engage the students, teachers and parents and persuade them to be involved in the activities of growing trees.
- 3) The data collection instruments can acquire adequate and valid data towards the research.

1.9 Theoretical Model

The proposal is developed using the theory of employee engagement (Gill, 2009). The Gallup Model of employee engagement highlights the implication of involvement and enthusiasm of employees at the workplace in the realisation of set objectives in the presence of entrenched behaviour (Gill, 2009).

In accordance with the Gallup Model, only 21% of the employees in the world belong to the category of engaged employees. This implies that a majority of workers (79 per cent) fall in the category of Theory X employees who are naturally lazy and have to be coerced to strive towards achievable goals of the organization (Mc Gregory, 1957). The manager should thus be obligated to engage in a way that will motivate them to take part in the organisation's matters with their zeal to achieve the objectives established. In an analysis to establish the linkage between employee satisfaction, employee engagement and business results, relying on the Gallup model of an established success-oriented culture, it was determined that managers played a crucial role in actualising organisational results by means of engaging employees (Harter, 2002).

School students, teachers and parents are like employees in an organisation, and this is the case in a management situation. They will be regarded as subordinates to the school principal in this research, who will involve them using empowerment, enablement and connection in entrenching tree growing, which means planting and taking care of trees. The teachers, students, and parents are important stakeholders of the school system in ensuring that the principal can achieve climate change mitigation activities, since in a school, there is a single principal who cannot act alone towards achieving government-set targets of tree growing. He is able to assign work to teachers under their group, like class teachers, subject teachers and club patrons. Teachers are able to access different numbers of students in their areas of responsibility. On a single command, a number of students leap into action in order to complete given tasks. The principal, in our case, depending on the number of students in a school, has a workforce that can be utilized to take measures to mitigate climate change as in the growing of trees when the students are sufficiently involved.

Gallup model suggests that employee engagement of employees comprises three (3) components that are summarized as empowerment, enablement and connection. Employees need authorisation to carry out and complete the task assigned, and this is due to empowerment. They need instruments and means of achieving the tasks from enablement, and easy flow between the diverse programs and executors via interconnectedness. Empowerment, enablement and connection as three pillars allow the creation of sustainable organisational culture, hence cooperative behaviour towards a set goal. Likewise, in the current study, climate change mitigation, which in this case is achieved by tree growing, should become a culture.

1.10 Definition of Terms

- **Climate change mitigation effort:** Mitigation simply means taking steps to slow down or reduce climate change. This involves cutting down the amount of greenhouse gases released from big sources like factories, vehicles, farms, and power plants. It also includes protecting and expanding natural systems like forests, soils, and oceans that naturally absorb carbon and help balance the climate.
- **Student engagement:** This means involving students in planning and decision-making processes so that they develop a sense of ownership, cooperation, and responsibility in supporting tree-growing activities and climate action.
- **Teacher engagement:** Teacher engagement involves giving teachers an active role in planning and decision-making so they can help build a culture of cooperation in tree-growing and climate mitigation efforts.

3. Research Methodology

3.1 Research Design

This study will adopt a descriptive survey design, which focuses on collecting information about existing situations or conditions to provide a clear, accurate, and systematic picture of the subject under study (Salaria, 2012). The descriptive survey method is particularly useful for identifying characteristics, patterns, frequencies, and trends within a population. It also allows for meaningful comparisons and interpretations, helping researchers to uncover relationships between different variables. According to McCombes (2023), this approach is especially effective when a study requires large volumes of data that can be analysed to reveal patterns, averages, or other statistical insights.

In the context of this study, a rating scale will be used to assess the effectiveness of principals in engaging teachers and other stakeholders in tree-growing activities for climate change mitigation. The scale will range from Very ineffective (0-0.9), Ineffective (1-1.9), Effective (2-2.9) and Very effective (3-3.9). After collecting data on the various attributes in the questionnaire, the scores for each parameter will be averaged. These averages will then be compared, and the parameter with the highest mean will indicate the overall level of effectiveness. For instance, if “Less Effective” scores the highest, it

would suggest that principals are not adequately promoting climate change mitigation activities in their schools.

3.2 Area of Study

This research will be carried out in Rarieda Sub-County. Geographically, the area lies at latitude 0°12'00.0", and longitude 34°20'00.0"E. Rarieda Sub-County is composed of a number of mixed-day secondary schools, making it an ideal setting for investigating how principals engage teachers and stakeholders in climate change mitigation activities. A detailed map of the area is provided in Appendix 1.

3.3 Sample and Sampling Technique

This section describes how participants for the study will be selected and the sampling methods employed. The sample will be drawn in a way that ensures it represents the broader population, allowing the findings to be reliable and generalizable. By carefully outlining the sampling strategy, the study ensures that the views of principals, teachers, students, parents, and the SCQASO are accurately captured, reflecting the overall dynamics of school engagement in climate change mitigation initiatives.

Table 3.1: The sample that will be used for the study

SN	Category	Population	Piloting	Sample Size	%
1	Principals	35	4	31	91.5
2	Teachers	576	20	226	39.2
3	Students	4,413	20	354	8.02
4	Parents Representatives	35	3	32	91.42
5	SCQASO	1	0	1	100

3.4 Instruments of Data Collection

3.4.1 Introduction

Data will be collected using questionnaires and interview schedules. These instruments have been chosen to capture both quantitative and qualitative information, allowing for a comprehensive understanding of how principals engage teachers, students, and parents in climate change mitigation activities.

3.4.2 Questionnaire

A questionnaire is a structured tool containing written questions that participants respond to, providing information about their knowledge, experiences, or opinions (Roopa & Rani, 2012). Questionnaires are particularly useful because they enable standardized data collection, ensuring consistency and facilitating statistical analysis.

3.4.2.1 Principal's Questionnaire

The principal's questionnaire will gather information on how they engage teachers, students, and parents in tree-growing activities for climate change mitigation. It will also

explore the strategies they employ to engage stakeholders and measure engagement through empowerment, enablement, and connection.

3.4.2.2 Teacher Questionnaire

The teacher questionnaire will collect data on how principals engage them, their knowledge of climate change and mitigation strategies, and their participation in tree-growing activities. Like the principal questionnaire, it will focus on empowerment, enablement, and connection as key indicators of engagement.

3.4.2.3 Students' Questionnaire

The students' questionnaire will explore their understanding of climate change, its effects, and possible mitigation measures. It will also capture how principals engage students in climate change mitigation through tree-growing and other school-led activities.

3.4.3 Interview Schedule

An interview schedule is a structured set of questions designed to guide the interviewer while collecting in-depth information (Diksha, 2023). It is particularly useful for clarifying responses and understanding participants' perspectives, experiences, feelings, and attitudes.

3.4.3.1 Parents' Interview Schedule

The parents' interview schedule will examine the extent to which principals engage parents in school activities, particularly in climate change mitigation through tree planting. It will also explore whether parents reinforce and support school-based tasks at home.

3.4.3.2 SCQASO Interview Schedule

The SCQASO interview schedule will focus on climate change mitigation initiatives within secondary schools in Rarieda Sub-County. It will gather information on tree-planting activities, the engagement of teachers, students, and parents, and any events or meetings that the SCQASO has observed or received reports on regarding climate change mitigation.

3.5 Validity and Reliability of Instruments

3.5.1 Validity

Validity refers to the extent to which an instrument measures what it is intended to measure (Crossman, 2019; Price, 2020). It ensures that the data collected accurately reflect the phenomenon under study. Types of validity are face validity, content validity and criterion validity. Face validity is whether the instrument appears, at first glance, to measure what it intends to measure. Content validity is whether the instrument covers all relevant aspects of the construct being studied. Criterion validity is whether the

instrument's results are consistent with other measures that they should theoretically correlate with.

Ensuring validity is crucial because it guarantees that the findings accurately represent the population and can be generalized to similar contexts (Pneumol, 2018). In this study, all instruments will be reviewed by experts from the Department of Education Management and Foundations at Maseno University, and their input will guide necessary revisions.

3.5.2 Reliability

Reliability refers to the consistency of a measurement (Price *et al.*, 2020; Oxford Dictionary Online, 2023). It indicates whether an instrument produces stable and dependable results over time. Reliability can be assessed in three ways: Test-retest reliability, which implies consistency over time. Internal consistency, which implies consistency across items within the instrument. Inter-rater reliability, which implies consistency across different researchers or observers.

This study will emphasize internal consistency reliability to ensure that the instruments consistently measure principals' engagement across all participants (Middleton, 2019).

3.6 Data Collection Procedure

Permission to conduct the study will be obtained from the Maseno University Scientific and Ethics Review Committee (MUSERC) and the National Commission for Science, Technology and Innovation (NACOSTI). Access to schools, principals, teachers, students, and parents will be authorized by the Sub-County Director of Education (SCDE).

Questionnaires will be delivered to schools; a request will be made to the principal, distributed, filled and collected in readiness for analysis. Interview schedules will be used to interview selected parents' representatives and SCQASO.

3.7 Data Analysis

Data analysis involves systematically organizing, modelling, and examining collected information to identify patterns, trends, and relationships (Calzon, 2023). Quantitative data will be analysed using descriptive statistics, including mean, standard deviation, and percentages, to assess the effectiveness of principals in climate change mitigation activities within Rarieda secondary schools.

For qualitative data, a rating scale will be used to determine the level of principals' engagement with various stakeholders. Table 3.7.1 is the rating scale for the study.

Table 3.7.1: Rating scale

Mean	0-0.9	1-1.9	2 – 2.9	3 – 3.9
Level of effectiveness	Very Ineffective	Ineffective	Effective	Very effective

From Table 3.7.1, the range from 0 to 0.9 will represent "Very ineffective", 1 to 1.9 "Ineffective", 2 to 2.9 "Effective", and 3 to 3.9 "Very effective". Mean frequencies and

standard deviations of each rating for each category of stakeholder will be calculated, and the modal value, the most frequently occurring score, will indicate the typical level of engagement for each stakeholder category. ANOVA and t-tests will be done on results obtained from various categories of stakeholders.

Table 3.7.2: The data analysis matrix

	The objective	Independent	Dependent variable	Tools
1	To establish the effectiveness of principals in engagement of students in tree growing for climate change mitigation in day secondary schools in Rarieda Sub-county	Principal engagement of students	<u>On empowerment:</u> - Opportunity to learn new concepts - Authority to oversee tree growing - Feedback from assessment - Socio-civic involvement - Capability to grow trees - Coaching of students - Choice of venues - Tree growing competition - Benchmarking on tree growing <u>On enablement:</u> - Provision of tools - Personalising space - Facilitate record-keeping - Feedback on tree-growing activity - Mentorship - Experience sharing - Rewards for successful tree growing <u>On connection:</u> - Concerns for joint action - Free communication - Sharing challenges - Motivating each other - Peer monitoring - Conflict resolution - Team competition - Celebrating tree-growing achievement - Punishment for non-participation	Presentation of frequencies, means, STD, ANOVA, Regression
2	To establish the effectiveness of the principal in engagement of teachers in tree growing for climate change	Principal engagement of teachers	<u>On empowerment:</u> - Learning new concepts - Delegated authority	Presentation of frequencies, means, STD, ANOVA, Regression

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	mitigation in secondary schools in Rarieda Sub-county		- Feedback from assessment - Socio-civic involvement - Capability to grow trees - Skills in tree growing - Tree growing competition - Benchmarking <u>On enablement:</u> - Provision of tools - Personalising space - Personalising trees - Record keeping - Feedback on tree growing - Attachment to mentors - Sharing with peers - Rewards for tree growing <u>On Connection:</u> - Concerns for joint action - Communication for clarity - Sharing challenges - Motivation - Conflict resolution - Team competition - Celebration of achievements	
3	To establish the effectiveness of Principals in engagement of parents in tree growing for climate change mitigation in secondary schools in Rarieda sub-county	Principal engagement of parents	<u>On empowerment:</u> - Opportunity to learn new concepts - Delegate authority to oversee growing - Feedback on assessment - Socio-civic involvement - Capability to grow trees - Coaching to boost skills - Making choices of venues - Participation in competition - Benchmarking on tree growing	Presentation of frequencies, means, STD, ANOVA, Regression

			<u>On enablement:</u> - Provision of tools - Personalise space for tree growing - Personalise trees - Provide materials for record-keeping - Feedback for action - Mentorship - Sharing experience - Reward successful tree growing <u>On connection:</u> - Raising concern for joint action - Free communication between parents - Sharing challenges faced - Parents motivate each other - Monitor feedback - Conflict resolution - Celebrating achievement - Punish non-participating members	
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3.8 Ethical Considerations

This study will uphold the highest ethical standards to protect the rights, dignity, and privacy of all participants. The key principles guiding this research include voluntary participation, informed consent, anonymity, confidentiality, justice and beneficence.

- **Voluntary participation** ensures that no one will be coerced into taking part in the study. Each potential participant will be clearly informed about the purpose and scope of the research. Participation will proceed only if the individual willingly agrees; anyone who declines will not be engaged in any form, and their decision will be fully respected (Mukabi, Simiyu & Chepngéno, 2023).
- **Informed consent** will be obtained after participants are made fully aware of how the data will be collected, used, and stored. The study is entirely academic, and the information provided will not be used for any commercial purpose or exchanged for financial or material gain. Participants will be briefed on the research, data to be collected, and the use of the data. Any data collected will not be shared with any institution or person, but will be used for the study, and access will be limited to those participating in the study.
- **Anonymity** will be strictly maintained. Personal identities will not be disclosed in any reports or publications unless participants give explicit permission for specific uses of their information. Details of the participants will not be collected, and

information on the institution will not be shared or disclosed to anyone. Information obtained will not be linked to any particular individual or institution.

- **Confidentiality** will be observed throughout the research process. All information given by the participants will be treated with care and kept private. The information will not be made public or broadcast in any way. If any information needs to be shared publicly, the researcher will first seek explicit consent from the individuals concerned.
- **Justice** will be observed throughout the research. Care will be taken not to infringe the rights of any member of the community. Fairness will be observed in analysis, presentation and conclusions made on the data obtained.
- **Beneficence** will be applied where cost is incurred or indemnity required. Where participants incur cost when participating in any part of the research, the researchers will indemnify the participants. At the end of the entire process, the researchers will donate some tree seedlings for planting within the sub-county. The cost of this is factored into the budget.

4. Presentation, Interpretation and Discussion of the Findings

4.1 Objective 1: To Establish the Effectiveness of Principals in Engagement of Student in Tree Growing for Climate Change Mitigation in Mixed Day Secondary Schools in Rarieda Sub-county.

4.1.1 The Responses from the Students on Principals' Engagement of Students

Table 4.1.1: The responses from students regarding the engagement of students by the principal in tree growing in mixed day secondary schools in Rarieda Sub-County

Statements	Yes	I do not know	No	Mean	Std. Deviation
Does the principal expose students to training as regards tree growing?	88 (26.2%)	2 (0.6%)	246 (73.2%)	1.53	0.88
Do students participate in public/ national/ county tree-growing activities authorized by the school?	86 (25.6%)	4 (1.2%)	246 (73.2%)	1.52	0.874
Are students in your school allowed to involve students in tree-growing activities?	51 (15.2%)	7 (2.1%)	278 (82.7%)	1.32	0.724
Do students plant trees in a ratio of 30% fruit trees and 70% other trees?	120 (35.7%)	11 (3.3%)	205 (61%)	1.75	0.952
Does your principal facilitate students with tools such as shovels and hoes to enhance the realization of tree growing?	62 (18.5%)	6 (1.8%)	268 (79.8%)	1.39	0.78
Does your principal encourage students reporting about tree-growing-related activities?	55 (16.4%)	13 (3.9%)	268 (79.8%)	1.37	0.749
Does your principal finance students-initiated activities on tree growing?	161 (47.9%)	8 (2.4%)	167 (49.7%)	1.98	0.989
Does your principal provide seedlings for planting by students at a ratio of 30% fruit trees and 70% other trees?	101 (30.1%)	8 (2.4%)	227 (67.6%)	1.63	0.915
Does your principal invite speakers to address students on tree growing?	128 (38.1%)	15 (4.5%)	193 (57.4%)	1.81	0.96
Is there principal- student communication	71	10	255	1.45	0.82

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regarding school-organized tree-growing activity?	(21.1%)	(3%)	(75.9%)		
Does the principal reward student success in team activity for tree growing?	140 (41.7%)	8 (2.4%)	188 (56%)	1.86	0.979
Does the principal reach out to students on progress in tree growing?	75 (22.3%)	23 (6.8%)	238 (70.8%)	1.51	0.836
Do students ever give reports to the school community about the trees they have grown?	82 (24.4%)	32 (9.5%)	222 (66.1%)	1.58	0.856
Overall mean				1.725	

Table 4.1.1 reveals that the principal engagement of students is low. The overall mean across all items was 1.725, showing that responses generally leaned toward No, with smaller proportions indicating Yes and very few I do not know. This reflects limited principal engagement in tree-growing activities with students.

4.1.2 The Responses from the Teachers on Principals' Engagement of Students

Table 4.4.2 shows the responses from the teachers regarding the engagement of students by the principals in tree-growing in mixed day secondary schools in Rarieda Sub-county.

Table 4.4.2: The responses from the teachers on principals' engagement of students

Statements	No	I do not know	Yes	Mean	Std. Deviation
Does the principal expose students to training as regards tree growing?	165 (76.7%)	12 (5.6%)	38 (17.7%)	1.41	0.773
Do students participate in socio-civic tree growing activities organized by the school	171 (79.5%)	5 (2.3%)	39 (18.1%)	1.39	0.776
Does the principal inform students to plant trees at a ratio of 30% fruit trees and 70% other trees?	169 (78.6%)	7 (3.3%)	39 (18.1%)	1.4	0.778
Does your principal facilitate students with tools such as shovels and hoes to enhance realization of tree growing?	167 (77.7%)	18 (8.4%)	30 (14%)	1.36	0.716
Does your principal encourage students reporting about tree growing related activities?	188 (87.4%)	5 (2.3%)	22 (10.2%)	1.23	0.618
Does your principal provide students with seedlings for planting by students at a ratio of 30% fruit trees and 70% other trees?	163 (75.8%)	14 (6.5%)	38 (17.7%)	1.42	0.774
Is there appropriate student communication regarding school organized tree growing activity?	175 (81.4%)	10 (4.7%)	30 (14%)	1.33	0.708
Does the principal reward student success in team activity for tree growing?	128 (59.5%)	17 (7.9%)	70 (32.6%)	1.73	0.923
Does the principal monitor tree-growing activity to ensure students have 30% fruit trees and 70% other trees?	187 (87%)	2 (0.9%)	26 (12.1%)	1.25	0.657
Overall mean				1.391	

Table 4.4.2 reveals that most teachers' views on principals' engagement with students are minimal. The overall mean across all items was 1.391, showing that responses generally leaned toward No, with relatively fewer Yes and Do not know answers. This indicates that principals' engagement in tree-growing activities with students was generally low according to the teachers' responses.

4.1.3 The Responses from the Principals on Principals' Engagement of Students

Table 4.1.3 shows the responses from the principals regarding the engagement of students by the principals in tree growing in mixed day secondary schools in Rarieda Sub-county.

Table 4.1.3: The responses from the principals on principals' engagement of students

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Std. Deviation
Students are given an opportunity to learn new concepts regarding tree growing for climate change mitigation through workshops.	14 (50%)	10 (35.7%)	4 (14.3%)	0	1.64	0.731
Authority is delegated to students to oversee their own tree-growing activity.	11 (39.3%)	14 (50%)	3 (10.7%)	0	1.71	0.659
Feedback arising out of student assessment of their own tree-growing activity is relied on.	7 (25%)	16 (57.1%)	5 (17.9%)	0	1.93	0.663
The principal supports students' socio-civic involvement in local tree-growing days.	14 (50%)	14 (50%)	0	0	1.5	0.509
The principal builds confidence in students in their capability to successfully grow 30% fruit trees and 70% other trees.	11 (39.3%)	13 (46.4%)	4 (14.3%)	0	1.75	0.701
The principal participates in coaching students' tree-growing leaders to boost their skills.	4 (14.3%)	19 (67.9%)	5 (17.9%)	0	2.04	0.576
The principal allows students to make choices of venues for tree-growing exercises.	8(28.6%)	8(28.6%)	12 (42.9%)	0	2.14	0.848
The principal allows students of my school to participate in tree-growing competitions.	2 (7.1%)	9 (32.1%)	17 (60.7%)	0	2.54	0.637
The principal allows benchmarking tree-growing exercises.	4 (14.3%)	21 (75%)	3 (10.7%)	0	1.96	0.508
The principal provides students with tools such as shovels and hoes to facilitate tree-growing activities.	18 (64.3%)	3 (10.7%)	7 (25%)	0	1.61	0.875
The principal allows parents to personalize space for their own tree growing at a ratio of 30% fruit trees and 70% other trees.	2 (7.1%)	20 (71.4%)	4 (14.3%)	2 (7.1%)	2.21	0.686
The principal allows parents to make choices of venues for tree-growing exercise.	5 (17.9%)	15 (53.6%)	8 (28.6%)	0	2.11	0.685
The principal allows parents of my school to participate in tree-growing competitions.	8 (28.6%)	16 (57.1%)	4 (14.3%)	0	1.86	0.651
The principal allows benchmarking tree growing exercises.	13 (46.4%)	10 (35.7%)	5 (17.9%)	0	2.71	0.763
The principal provides parents with tools such as shovels and hoes to	1 (3.6%)	21 (75%)	6 (21.4%)	0	2.18	0.476

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facilitate tree-growing activities.						
The principal allows students to personalize space for their own tree growing at a ratio of 30% fruit trees and 70% other trees.	6 (21.4%)	7 (25%)	12 (42.9%)	3 (10.7%)	2.43	0.959
The principal allows students to personalize trees that are already planted for their own caretaking.	10 (35.7%)	10 (35.7%)	6 (21.4%)	2 (7.1%)	2	0.943
The principal provides writing materials to facilitate record-keeping to sustain tree-growing activity.	2 (7.1%)	20 (71.4%)	3 (10.7%)	3 (10.7%)	2.25	0.752
The principal allows students to give feedback regarding tree-growing activity for action from observation opportunities.	6 (21.4%)	10 (35.7%)	8 (28.6%)	4 (14.3%)	2.36	0.989
The principal attaches students to experienced mentors to facilitate learning for tree growing success.	2 (7.1%)	19 (67.9%)	5 (17.9%)	2 (7.1%)	2.25	0.701
The principal allows students with relatively more information and experience to share with peers for the promotion of tree-growing activity.	7 (25%)	2 (7.1%)	13 (46.4%)	6 (21.4%)	2.64	1.096
The principal allows students to broaden the scope of tree growing beyond what is initially planned for.	10 (35.7%)	10 (35.7%)	4 (14.3%)	4 (14.3%)	2.07	1.052
The principal reward is successful tree planting with more trees to plant.	3(10.7%)	15(53.6%)	4(14.3%)	6(21.4%)	2.46	0.962
The principal encourages students to raise their concerns over the success of tree-growing activity for joint action.	2 (7.1%)	17 (60.7%)	6 (21.4%)	3 (10.7%)	2.36	0.78
There is free communication between students to clarify issues of tree growing of 30% fruit trees and 70% other trees.	2 (7.1%)	15 (53.6%)	5 (17.9%)	6 (21.4%)	2.54	0.922
The principal allows students to share challenges faced in the course of tree growing activity.	2 (7.1%)	24 (85.7%)	1 (3.6%)	1 (3.6%)	2.04	0.508
The principal encourages students to motivate each other in the tree-growing activity.	2 (7.1%)	22 (78.6%)	2 (7.1%)	2 (7.1%)	2.14	0.651
The principal uses team leaders to monitor and give feedback to their membership for action.	22 (78.6%)	4 (14.3%)	2 (7.1%)		2.29	0.6
A coordinated student conflict resolution in team activity exist in the school.	4 (14.3%)	18 (64.3%)	3 (10.7%)	3 (10.7%)	2.18	0.819
The principal organizes team competition based on tree-growing records.	6 (21.4%)	11 (39.3%)	5 (17.9%)	6 (21.4%)	2.39	1.066
The principal organizes the celebration of tree-growing achievements of students.	3 (10.7%)	18 (64.3%)	6 (21.4%)	1 (3.6%)	2.18	0.67
Principal punishes non-participating members of the student community.	1 (3.6%)	16 (57.1%)	8 (28.6%)	3 (10.7%)	2.154	0.744
Overall mean					2.154	0.744

Table 4.1.3 reveals that the overall mean across all items was 2.154, showing that responses generally leaned toward Disagree and Strongly Disagree, with fewer Agree and Strongly Agree. This indicates that principals' engagement of students in tree-growing activities was generally limited.

4.1.4 The Responses from the Parents on Principals' Engagement of Students

Table 4.1.4 shows the responses from the parents regarding the engagement of students by the principals in tree-growing in mixed day secondary schools in Rarieda Sub-county

Table 4.1.4: Response from parents on principals' engagement of students

Statements	Yes	No	Mean	Std. Deviation
Does the principal allow students to come up with ideas for implementation of tree growing?	9 (33.3%)	17 (63.0%)	1.35	0.485
Does the principal provide the students with the necessary items required for tree growing	10 (37.0%)	16 (59.3%)	1.38	0.496
Do the principal and the students communicate regularly on matters of tree growing	9 (33.3%)	17 (63.0%)	1.35	0.485
Has the principal provided sufficient knowledge on tree growing?	9 (33.3%)	17 (63%)	1.35	0,485
Overall mean			1.357	

Table 4.1.4 show that most responses leaned towards no. The overall mean for objective 1 is 1.65675. This indicates that the principals are less effective in engagement of students in tree growing for climate change mitigation.

4.2 Objective 2: To Establish the Effectiveness of Principals in Engagement of Teachers in Tree Growing for Climate Change Mitigation in Mixed Day Secondary Schools in Rarieda Sub-county

4.2.1 The Responses from the Students on Principals' Engagement of Teachers

Table 4.2.1 shows the responses from the students regarding the engagement of teachers by the principals in tree-growing in mixed day secondary schools in Rarieda Sub-county.

Table 4.2.1: The responses from the students on principals' engagement of teachers

Statements	Yes	I do not know	No	Mean	Std. Deviation
Does the principal expose teachers to training as regards tree growing?	66 (19.8%)	2 (0.6%)	266 (77.3%)	1.41	0.805
Do teachers participate in public/ national/ county tree-growing activities authorized by the school?	48 (14.0%)	7 (2.0%)	281 (81.7%)	1.31	0.707
Are teachers in your school allowed to involve students in tree-growing activities?	14 (4.2%)	1 (0.3%)	321 (95.5%)	1.09	0.403
Do teachers plant trees in a ratio of 30% fruit trees and 70% other trees?	123 (35.8%)	7 (2.1%)	207 (60.2%)	1.75	0.96
Does your principal facilitate teachers with tools such as shovels and hoes to enhance the realization of tree growing?	70 (20.3%)	1 (0.3%)	265 (77.0%)	1.42	0.814
Does your principal encourage teachers	37	15	284	1.26	0.645

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reporting on tree-growing-related activities?	(10.8%)	(4.4%)	(82.6%)		
Does your principal finance teacher-initiated activities on tree growing?	106 (31.5%)	9 (2.7%)	221 (65.8%)	1.66	0.927
Does your principal provide seedlings for planting by teachers at a ratio of 30% fruit trees and 70% other trees?	91 (27.1%)	3 (0.9%)	242 (72%)	1.55	0.89
Does your principal invite speakers to address teachers on tree growing?	130 (38.7%)	206 (61.3%)	0	1.77	0.976
Is there principal- teacher communication regarding school-organized tree-growing activity?	60 (17.9%)	4 (1.2%)	272 (81%)	1.37	0.769
Does the principal reward teacher success in team activity for	127 (37.8%)	8 (2.4%)	201 (59.8%)	1.78	0.965
Does the principal reach out to teachers on progress on tree growing	51 (15.2%)	5 (1.5%)	280 (83.3%)	1.32	0.723
Do teachers ever give reports to the school community about the trees they have grown?	103 (30.7%)	1 (0.3%)	232 (69%)	1.62	0.923
Overall mean				1.485	

Table 4.2.1 revealed that most principals were not engaging teachers. The overall mean across all items was 1.485, showing that responses generally leaned toward No, with smaller proportions indicating Yes and very few I do not know. This reflects limited principal engagement in tree-growing activities with teachers.

4.2.2 The Responses from the Teachers on Principals' Engagement of Teachers

Table 4.2.2 shows the responses from the teachers regarding the engagement of teachers by the principals in tree-growing in mixed day secondary schools in Rarieda Sub-county.

Table 4.2.2: The responses from the teachers on principals' engagement of teachers

Statements	No	I do not Know	Yes	Mean	Std. Deviation
Does the principal expose you to training as regards tree growing?	180 (83.7%)	9 (4.2%)	26 (12.1%)	1.28	0.669
Do you participate in socio-civic tree growing activities organized by the school?	168 (78.1%)	47 (21.9%)		1.44	0.829
Does your principal inform you about the need to plant trees at a ratio of 30% fruit trees and 70% other trees?	168 (78.1%)	1 (0.5%)	46 (21.4%)	1.43	0.822
Does your principal facilitate you with tools such as shovels and hoes to enhance the realization of tree growing?	159 (74%)	4 (1.9%)	52 (24.2%)	1.5	0.859
Does your principal encourage reporting on tree-growing-related activities?	163 (75.8%)	6 (2.8%)	46 (21.4%)	1.46	0.824
Does your principal provide you with seedlings for planting by teachers at a ratio of 30% fruit trees and 70% other trees?	154 (71.6%)	9 (4.2%)	52 (24.2%)	1.53	0.858
Does the principal facilitate appropriate communication between you as colleagues regarding school-organized tree-growing activity	159 (74%)	13 (6%)	43 (20%)	1.46	0.807
Does the principal reward activity in the team	116	1	98	1.92	0.996

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activity for tree growing?	(54%)	(0.5%)	(45.6%)		
Does the principal monitor tree-growing activity to ensure teachers have 30% fruit trees and 70% other trees?	164 (76.3%)	8 (3.7%)	43 (20%)	1.44	0.806
Overall mean				1.1633	

Table 4.2.2 shows that the overall mean across all items was 1.1633, showing that responses generally leaned toward No, with relatively fewer Yes and Do not know answers. This indicates that principals' engagement in tree-growing activities with teachers was generally low, according to the teachers' responses.

4.2.3 The Responses from the Principals on Principals' Engagement of Teachers

Table 4.2.3 shows the responses from the principals regarding the engagement of teachers by the principals in tree growing in mixed day secondary schools in Rarieda Sub-county.

Table 4.2.3: The responses from the principals on principals' engagement of teachers

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Std. Deviation
Teachers are given an opportunity to learn new concepts regarding tree growing for climate change mitigation through workshops.	12 (42.9%)	15 (53.6%)	1 (3.6%)	0	1.61	0.567
Authority is delegated to teachers to oversee their own tree-growing activity.	9 (32.1%)	19 (67.9%)	0	0	1.68	0.476
Feedback obtained from teachers out of assessment of their own tree-growing activity.	9 (32.1%)	11 (39.3%)	8 (28.6%)	0	1.96	0.793
Teachers supported in socio-civic involvement in local tree-growing days.	9 (32.1%)	17 (60.7%)	2 (7.1%)	0	1.75	0.585
Confidence is built in teachers in their capability to successfully grow 30% fruit trees and 70% other trees.	11 (39.3%)	15 (53.6%)	2 (7.1%)	0	1.68	0.612
Coaching of teachers on tree growing done to boost their skills.	6 (21.4%)	18 (64.3%)	4 (14.3%)	0	1.93	0.604
Teachers make choices of venues for tree-growing exercises.	11 (39.3%)	17 (60.7%)	0	0	1.61	0.497
Teachers in the school to participate in tree-growing competitions.	20 (71.4%)	3 (10.7%)	5 (17.9%)	0	2.46	0.793
Teachers participate in benchmarking tree-growing exercises.	19 (67.9%)	5 (17.9%)	4 (14.3%)	0	2.46	0.744
Teachers are provided with tools such as shovels and hoes to facilitate tree-growing activities.	15 (53.6%)	13 (46.4%)	0	0	1.46	0.508
Teachers are allowed to personalize space for their own tree-growing at 30% fruit trees and 70% other trees.	9 (32.1%)	10 (35.7%)	7 (25%)	2 (7.1%)	2.07	0.94
Teachers personalize trees that are already planted for their own caretaking.	3 (10.7%)	22 (78.6%)	1 (3.6%)	2 (7.1%)	2.07	0.663
Writing materials are provided to facilitate record-keeping to sustain tree-growing	9 (32.1%)	12 (42.9%)	7 (25%)	0	1.93	0.766

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activity.						
Teachers are allowed to give feedback regarding tree-growing activity for action from observation opportunities.	10 (35.7%)	18 (64.3%)	0	0	1.64	0.488
Teachers attached to experienced mentors to facilitate learning for tree-growing success.	3 (10.7%)	13 (46.4%)	6 (21.4%)	6 (21.4%)	2.54	0.962
Teachers with relatively more information and experience are allowed to share with peers for promotion of tree growing activity.	13 (46.4%)	15 (53.6%)	0	0	1.54	0.508
Teachers are allowed to broaden the scope of tree growing beyond what is initially planned for.	4 (14.3%)	22 (78.6%)	2 (7.1%)		1.93	0.466
Successful tree planting is rewarded with more trees for planting.	4 (14.3%)	16 (57.1%)	3 (10.7%)	5 (17.9%)	2.32	0.945
Teachers raise their concerns over the success of tree-growing activity for joint action.	8 (28.6%)	19 (67.9%)	1 (3.6%)	0	1.75	0.518
There is free communication between teachers to clarify issues of tree growing 30% fruit trees and 70% other trees.	10 (35.7%)	11 (39.3%)	7 (25%)	0	1.89	0.786
Teachers are allowed to share challenges faced in the course of tree-growing activity.	20 (71.4%)	8 (28.6%)	0	0	1.29	0.46
Teachers are encouraged to motivate each other on tree growing activity.	16 (57.1%)	12 (42.9%)	0	0	1.43	0.504
Team leaders to monitor and give feedback to their membership for action.	2 (7.1%)	21 (75%)	1 (3.6%)	4 (14.3%)	2.25	0.799
A coordinated conflict resolution in teacher team activity exists in my school.	4 (14.3%)	20 (71.4%)	4 (14.3%)	0	2	0.544
Team competition is recognised based on tree growing records.	3 (10.7%)	20 (71.4%)	3 (10.7%)	2 (7.1%)	2.14	0.705
Celebration of tree-growing achievements for teachers is organised.	6 (21.4%)	15 (53.6%)	4 (14.3%)	3 (10.7%)	2.14	0.891
Non-participating members are punished.	5 (17.9%)	17 (60.7%)	2 (7.1%)	4 (14.3%)	2.18	0.905
Overall mean					1.989	

Table 4.2.3 shows that most of them disagree with the statements. The overall mean across all items was 1.989, showing that responses generally leaned toward Disagree and Strongly Disagree, with fewer Agree and Strongly Agree. This indicates that principals' empowerment of teachers in tree-growing activities was generally limited.

4.2.4 The Responses from the Parents on Principals' Engagement of Teachers

Table 4.2.4 shows the responses from the parents regarding the engagement of teachers by the principals in tree-growing in mixed-day secondary schools in Rarieda Sub-county.

Table 4.2.4: Response from parents on principals' engagement of teachers

Statements	Yes	No	Mean	Std. Deviation
Does the principal empower teachers to participate in tree growing	9 (33.3%)	17 (63%)	1.35	0.485
Does the principal provide teachers with the necessary resources required for tree growing?	8 (29.6%)	18 (66.7%)	1.31	0.471
Do the principal and the teachers communicate regularly on matters of tree growing?	10 (37%)	16 (59.3%)	1.38	0.496
Has the principal provided sufficient knowledge on tree growing?	9 (33.3%)	17 (63%)	1.35	0.485
Overall mean			1.34	

The results from Table 4.2.4 lean towards No. Some parents were not aware of what goes on in school. The overall mean for objective 2 is 1.4943. This implies that the principals are less effective in engagement of teachers in tree growing for climate change mitigation.

4.3 Objective 3: To Establish the Effectiveness of Principals in Engagement of Parents in Tree Growing for Climate Change Mitigation in Mixed Day Secondary Schools in Rarieda Sub-county

4.3.1 The Responses from the Students on Principals' Engagement of Parents

Table 4.6.1 shows the responses from the students regarding the engagement of parents by the principals in tree growing in mixed day secondary schools in Rarieda Sub-county.

Table 4.6.1: The responses from the students on principals' engagement of parents

Statements	Yes	I do nor Know	No	Mean	Std. Deviation
Does the principal expose parents to training as regards tree growing?	144 (42.9%)	0	192 (57.1%)	1.86	0.991
Do parents participate in public/ national/ county tree-growing activities authorized by the school?	93 (27.7%)	0	243 (72.3%)	1.55	0.896
Are parents in your school allowed to involve other parents in tree-growing activities?	61 (18.2%)	0	275 (81.8%)	1.36	0.772
Do parents plant trees at a ratio of 30% fruit trees and 70% other trees?	60 (17.9%)	0	276 (82.1%)	1.36	0.767
Does your principal facilitate parents with tools such as shovels and hoes to enhance realization of tree growing?	106 (31.5%)	0	230 (68.5%)	1.62	0.931
Does your principal encourage parents reporting on tree-growing-related activities?	96 (28.6%)	0	240 (71.4%)	1.57	0.905
Does your principal finance parent initiated activities on tree growing?	164 (48.8%)	0	172 (51.2%)	1.98	1.001
Does your principal provide seedlings for planting by parents at a ratio of 30% fruit trees and 70% other trees?	100 (29.8%)	0	236 (70.2%)	1.60	0.916
Does your principal invite speakers to address parents on tree growing?	7 (2.1%)	0	329 (97.9%)	1.04	0.286
Is there principal-parent communication regarding school-organized tree-growing	84 (25%)	0	252 (75%)	1.50	0.867

activity?					
Does the principal reward parents' success in team activity for tree growing?	131 (39%)	0	205 (61%)	1.78	0.977
Does the principal reach out to parents on progress in tree growing	87 (25.9%)	0	249 (74.1%)	1.52	0.877
Do parents ever give reports to the school community about the trees they have grown?	114 (33.9%)	0	222 (66.1%)	1.68	0.948
Overall mean				1.57	

Table 4.6.1 indicates that, according to most students, their parents are not involved in matters of tree growing. The overall mean across all items was 1.57, showing that responses generally leaned toward No, with smaller proportions indicating Yes and very few I do not know. This reflects limited principal engagement in tree-growing activities with parents.

4.3.2 The Responses from the Teachers on Principal Engagement of Parents

Table 4.3.2 shows the responses from the teachers regarding the engagement of parents by the principals in tree-growing in mixed-day secondary schools in Rarieda Sub-county.

Table 4.3.2: The responses from the teachers on principals' engagement of parents

Statements	No	I do not Know	Yes	Mean	Std. Deviation
Does the principal expose parents to training as regards tree growing?	167 (77.7%)	48 (22.3%)		1.45	0.835
Do parents participate in socio-civic tree-growing activities organized by the school?	144 (67%)	4 (1.9%)	67 (31.2%)	1.64	0.926
Does the principal inform parents about the need to plant 30% fruit trees and 70% other trees?	183 (85.1%)	4 (1.9%)	28 (13%)	1.28	0.681
Does your principal facilitate parents with tools such as shovels and hoes to enhance the realization of tree growing?	158 (73.5%)	10 (4.7%)	47 (21.9%)	1.48	0.831
Does your principal encourage parents reporting on tree-growing-related activities?	174 (80.9%)	1 (0.5%)	40 (18.6%)	1.38	0.781
Does your principal provide parents with seedlings for growing trees at a ratio of 30% fruit trees and 70% other trees?	170 (79.1%)	9 (4.2%)	36 (16.7%)	1.38	0.757
Does the principal facilitate appropriate parent communication regarding the school-organized tree-growing activity?	183 (85.1%)	9 (4.2%)	23 (10.7%)	1.26	0.637
Does the principal reward parents' success in team activity for tree growing?	150 (69.8%)	9 (4.2%)	56 (26%)	1.56	0.878
Does the principal monitor tree-growing activity to ensure parents have 30% fruit trees and 70% other trees?	161 (74.9%)	3 (1.4%)	51 (23.7%)	1.49	0.853
Overall mean				1.435	

The overall mean across all items was 1.435, showing that responses generally leaned toward No, with relatively fewer Yes and Do not know answers. This indicates that principals' engagement in tree-growing activities with the parents was generally low, according to the teachers' responses.

4.3.3 The Responses from the Principals on Principals' Engagement of Parents

Table 4.3.3 shows the responses from the principals regarding the engagement of parents by the principals in tree growing in mixed day secondary schools in Rarieda Sub-county.

Table 4.6.3: The responses from the principals-on-principals' engagement of parents

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Std. Deviation
The principal allows parents to personalize space for their own tree growing at a ratio of 30% fruit trees and 70% other trees.	2 (7.1%)	20 (71.4%)	4 (14.3%)	2 (7.1%)	2.21	0.686
The principal allows parents to personalize trees that are already planted for their own caretaking.	11 (39.3%)	13 (46.4%)	4 (14.3%)	0	1.89	0.994
The principal provides writing materials to facilitate record-keeping to sustain tree-growing activity.	8 (28.6%)	14 (50%)	6 (21.4%)		1.93	0.716
The principal allows parents to give feedback regarding tree-growing activity for action from observation opportunities.	15 (53.6%)	4 (14.3%)	9 (32.1%)	0	1.79	0.917
The principal attaches parents to experienced mentors to facilitate learning for tree growing success.	8 (28.6%)	15 (53.6%)	2 (7.1%)	3 (10.7%)	2	0.903
The principal allows parents with relatively more information and experience to share with peers for promotion of tree growing activity.	9 (32.1%)	12 (42.9%)	4 (14.3%)	3 (10.7%)	2.04	0.962
The principal allows parents to broaden the scope of tree growing beyond what is initially planned for.	3 (10.7%)	16 (57.1%)	5 (17.9%)	4 (14.3%)	2.36	0.87
The principal rewards successful tree planting with more trees to plant.	6 (21.4%)	19 (67.9%)	3 (10.7%)	0	1.89	0.567
The principal invites parents to raise their concerns over the success of tree-growing activity for joint action.	13 (46.4%)	8 (28.6%)	7 (25%)	0	1.79	0.833
There is free communication between parents to clarify issues of tree growing of 30% fruit trees and 70% other trees.	15 (53.6%)	10 (35.7%)	3 (10.7%)	0	1.57	0.69
The principal allows parents to share challenges faced in the course of tree growing activity.	8 (28.6%)	17 (60.7%)	3 (10.7%)	0	1.82	0.612
The principal encourages parents to motivate each other in tree-growing activity.	18 (64.3%)	9 (32.1%)	1 (3.6%)	0	1.39	0.567
The principal uses team leaders to monitor and give feedback to their membership for action.	12 (42.9%)	11 (39.3%)	5 (17.9%)	0	1.75	0.752
A coordinated parents' conflict resolution	12	10	6	0	1.79	0.787

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in a team.	(42.9%)	(35.7%)	(21.4%)			
The principal organizes team competition based on tree-growing records	1 (3.6%)	20 (71.4%)	7 (25%)	0	2.21	0.499
The principal organizes a celebration of tree growing achievement of students	5 (17.9%)	19 (67.9%)	4 (14.3%)	0	1.96	0.576
Principal punishes non-participating members of the student community	3 (10.7%)	15 (53.6%)	10 (35.7%)	0	2.25	0.645
The principal provides parents opportunity to learn new concepts regarding tree growing for climate change mitigation through workshops.	4 (14.3%)	20 (71.4%)	4 (14.3%)	0	2	0.544
The principal delegates authority to parents to oversee their own tree-growing activity.	2 (7.1%)	18 (64.3%)	8 (28.6%)	0	2.21	0.568
The principal relies on feedback arising from parents' assessment of their own tree growing activity.	2 (7.1%)	19 (67.9%)	7 (25%)	0	2.18	0.548
The principal support for parent socio-civic involvement in local tree-growing days.	23 (82.1%)	5 (17.9%)	0	0	2.18	0.39
The principal builds confidence in students in their capability to successfully grow 30% fruit trees and 70% other trees.	23 (82.1%)	5 (17.9%)	0	0	2.18	0.39
The principal participates in coaching parents tree growing leaders to boost their skills.	2 (7.1%)	17 (60.7%)	9 (32.1%)	0	2.25	0.585
The principal allows parents to make choices of venues for tree-growing exercises.	5 (17.9%)	15 (53.6%)	8 (28.6%)	0	2.11	0.685
The principal allows parents of my school to participate in tree-growing competitions.	8 (28.6%)	16 (57.1%)	4 (14.3%)	0	1.86	0.651
The principal allows benchmarking tree growing exercises.	13 (46.4%)	10 (35.7%)	5 (17.9%)	0	2.71	0.763
The principal provides parents with tools such as shovels and hoes to facilitate tree-growing activities.	1 (3.6%)	21 (75%)	6 (21.4%)	0	2.18	0.476
Overall mean					2.025	

Table 4.6.3 show that, according to them, they do involve parents where possible.

The overall mean across all items was 2.025, indicating that according to the principals, they are moderately effective in engagement of parents in tree planting for climate change mitigation.

4.3.4 The Responses from the Parents on Principals' Engagement of Parents

Table 4.3.4 shows the responses from the parents regarding the engagement of parents by the principals in tree planting in mixed day secondary schools in Rarieda Sub-county.

Table 4.3.4: Response from parents on principals' engagement of parents

Statements	Yes	No	Mean	Std. Deviation
Has the principal provided sufficient knowledge on tree growing?	9 (33.3%)	17 (63%)	1.35	0.485
Does the principal provide parents with the resources required to grow trees?	5 (18.5%)	21 (77.8)	1.19	0.402
Do the parents and the principal communicate regularly on issues of tree growing?	8 (29.6%)	18 (66.7%)	1.31	0.471
Overall mean			1.283	

Table 4.3.4 shows that most of them do not agree on issues of engagement from the principals. The overall mean across all items was 1.283, showing that responses generally leaned toward No, with relatively fewer Yes answers. This indicates that principals' engagement in tree-growing activities with parents was generally low according to the parents' responses.

The overall mean for objective 3 is 1.5783. This implies that principals are less effective in engagement of parents in tree growing for climate change mitigation.

4.4 Response from SCQASO

Interview done with SCQASO showed a very interesting trend in principals' engagement of students, teachers and parents in tree growing. He noted that the primary focus of most principals was on academic work, and so most of their attention goes towards that end.

In fulfilment of directives, most principals comply during the enforcement period, after which the matter is set aside. Where costs are involved, little success is realised due to limited budget allocation on environmental conservation matters. Where resources come from donors, for example, when the government mobilised well-wishers to donate tree seedlings, principals ensure total participation by students through teachers. The SCQASO noted that it is rare for parents to be involved in issues of environmental conservation such as tree growing by the principals. Most discussion with parents revolves around payment of levies due to the school, discipline issues and students' performance.

5. Conclusions

The study concludes that principals are less effective in engagement of students, teachers and parents in tree growing for climate change mitigation.

While there is clear awareness of the importance of environmental conservation, the findings show that principals rarely provide training, resources, or consistent communication to support these initiatives. Teachers are not empowered to lead activities, students are involved only in directive ways without opportunities for initiative, and parents are minimally included in environmental programs.

The study concludes that principals' engagement in tree-growing activities with teachers, students, and parents is generally low. Teachers are not enabled or resourced to

participate, students are involved only in directive ways without opportunities for initiative, and parents are largely excluded from environmental programs. Although environmental conservation is recognized as important, the findings consistently show that financial shortages, workload pressures, inadequate infrastructure, and weak institutional support limit effective participation.

The study concludes that principals' empowerment of teachers, students, and parents in tree-growing activities is generally limited. Teachers were not empowered to take initiative, students were involved in directive ways with little room for participation, and parents were minimally engaged in school-based environmental programs. Although principals acknowledged factors such as environmental conservation, ministerial policy, and community support as motivators, the findings consistently revealed that resource shortages, workload pressures, and weak institutional structures hinder effective engagement.

Therefore, the principals in Rarieda Sub-County are not effective in engagement of students, teachers and parents in tree growing for climate change mitigation.

5.1 Suggestions for Further Research

A study should be done on: influence of principal-led capacity-building programs on teachers' implementation of tree growing and environmental conservation in public schools.

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Conflict of Interest Statement

The authors declare no conflicts of interest.

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References

- Bourne, M. (2022). *Regreening Africa: Kenyan schools championing regreening in Africa*. Retrieved from <https://regreeningafrica.org/author/m-muthuri/page/10/>
- Burnage, S. (2017). *Parental engagement: Some ideas and approaches*. SecEd, the voice for secondary education, UK. Retrieved from <https://www.sec-ed.co.uk/best-practice/parental-engagement-some-ideas-and-approaches/>
- Calzon, B. (2023). *Your modern business guide to data analysis methods and techniques*; The datapine blog. Retrieved from <https://www.datapine.com/blog/data-analysis-methods-and-techniques/>
- CDC. (2018). *Parents engagement in school*. Retrieved from https://www.cdc.gov/healthyyouth/protective/parent_engagement.htm#print
- Citizen TV (2023). Citizen TV 9pm news, 6th September, 2023.
- Collins, L.M. (2007). *Research designs and methods*, ScienceDirect.
- Crossman, A. (2019). *Understanding validity in sociology*. Retrieved from <https://www.thoughtco.com/validity-definition-3026737#>
- EUROSTAT, (2023). Forest, forestry and logging. Online publication. Retrieved from [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Forests, forestry and logging](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Forests,_forestry_and_logging)
- Gallup, Inc. (2013). Retrieved from <https://www.gallup.com/workplace/285674/improve-employee-engagement-workplace.aspx#:>
- Gill, D.S. (2007). Employee selection and work engagement, Kansas State University, Manhattan, Kansas.
- Gill, J., & Truss, C. (2009). Managing the HR Function: The Role of Social Capital. *Personnel Review*, 38, pp. 674-695. <http://dx.doi.org/10.1108/00483480910992274>
- Global Forest Watch (2023). Retrieved from <https://www.globalforestwatch.org>
- Harter, J. K. (2002). Business Unit Level-Relationship between employee satisfaction, employee engagement and business outcomes; *Journal of Applied Psychology (American Psychological Association)*. Vol. 87, Issue 2, pp 268-279. <https://typeset.io/explore/topics/employee-engagement-3gjwbj6s>
- Holton, B., Baruch, Y., Aguinis, H., & Ballinger, G. (2022). Survey response rates: Trends

- and a validity assessment. Retrieved from https://www.researchgate.net/publication/358314297_Survey_response_rates_Trends
- Irungu, C., Kageema, J. & Gachahi, M. (2019). Influence of principals' collaborative practices on students' performance in secondary schools in Murang'a and Kirinyaga Counties, Kenya. Retrieved from <https://doi.org/10.7575/aiac.ijels.v.7n.4p.35>
- Just One Tree (2023). The power of trees: our mission to make it rain in Kenya. Retrieved from https://www.justonetree.life/articles_our_mission_to_make_it_rain_in_kenya.html
- Kenya National Bureau of Statistics (2013). Exploring Kenya's Inequality, Nairobi, Kenya. Retrieved from <https://www.sidint.org/sites/default/files/2024-02/Exploring%20Kenya%27s%20Inequality%20-%20Pulling%20Apart%20or%20Pooling%20Together-compressed.pdf>
- Kilonzo, T.M., Were, S. & Odhiambo, R. (2018). *Influence of employee engagement on the performance of teachers in secondary schools in Machakos County*. Jomo Kenyatta University of Science and Technology. Retrieved from <https://www.semanticscholar.org/paper/Influence-of-Employee-Engagement-on-the-Performance-Kilonzo-Were/d63b1851850c620eb899bfdb769726d42387a1c1>
- McCombes, S. (2023). Descriptive research: definition, types, methods and examples. Retrieved from <https://www.scribbr.com/methodology/descriptive-research/>
- Mc Gregory, D. (1957). The human side of the enterprise, Massachusetts Institute of Technology. Retrieved from https://web.mit.edu/curhan/www/docs/Articles/15341_Readings/McGregor_The_Human_Side_of_Enterprise.pdf
- Middletone, F. (2019). The four types of reliability in research. Retrieved from <https://www.scribbr.com/methodology/types-of-reliability/>
- Ministry of Education (1987). A manual for heads of secondary schools in Kenya, revised edition, Nairobi, Kenya.
- Ministry of Education, Science & Technology (2006). A handbook of financial management, Instructions for Secondary Schools, Colleges and Polytechnics, Nairobi, Kenya.
- Mukabi, F.E.K., Simiyu, D.N. & Chepng'eno, V.K. (2023). Simplified Research Methods; Aura Publishers, Nairobi, Kenya. Retrieved from https://www.researchgate.net/publication/362801796_SIMPLIFIED_RESEARCH_METHODS_FOR_SOCIAL_SCIENTISTS
- Mwarari, C.N., Githui, P. & Mwenje, M (2020). Parental involvement in the implementation of competency-based curriculum in Kenya: Perceived challenges and opportunities, *American Journal of Humanities and Social Sciences Research (AJHSSR)*, Volume 4, Issue 3, pp-201-208. Retrieved from https://www.researchgate.net/publication/343263381_PARENTAL_INVOLVEME

NT IN THE IMPLEMENTATION OF COMPETENCY BASED CURRICULUM IN KENYA PERCEIVED CHALLENGES AND OPPORTUNITIES

- Ndege, T.M. (2010). *Students' engagement and student retention at Moi University, Kenya*. A paper presented at the Business and Economics Society International Conference at Athens, Greece, July 15-19, 2010. Retrieved from https://www.researchgate.net/publication/258486981_Students'_Engagement_and_Student_Retention_in_Moi_University_Kenya
- Oso, W.Y., & Onen, D. (2009). A general guide to writing research proposal and report. Nairobi: Jomo Kenyatta Foundation. Retrieved from <https://unilibrary.zetech.ac.ke/bib/4094>
- Price, P. *et al.* (2020). Research Methods in Psychology - 2nd Canadian Edition, Victoria, BC. Retrieved from <https://opentextbc.ca/researchmethods/>
- Republic of Kenya (2023). Circular No. OP/CAB/17A, 30th January, 2023.
- Republic of Kenya (2023). The Kenya Gazette, Vol. CXXV-No. 238, 6th November, 2023.
- Riedi Chris (2016). Climate change, University of Technology Sydney, Retrieved from https://www.researchgate.net/publication/311301385_Climate_Change
- Roopa, S. & Rani, MS. (2012). Questionnaire Designing for a Survey. *J Ind Orthod Soc*; 46(4) pp. 273-277. <https://doi.org/10.5005/jp-journals-10021-1104>
- Stancil, J.M. (2015). The power of one tree – the very air we breath; U.S. Department of Agriculture. Retrieved from <https://www.usda.gov/media/blog/2015/03/17/power-one-tree-very-air-we-breathe#>:
- Surum, J. (2018). Student academic engagement and the academic achievement of form one students in Dadaab refugee camp, Kenya. University of Kabanga, Kenya. Retrieved from https://www.researchgate.net/publication/373359034_Student_Academic_Engagement_and_the_Academic_Achievement_of_Form_One_Students_in_Dadaab_Refugee_Camp_Kenya
- The Standard (2023). The Standard Newspaper, 7th September, 2023.
- TSC. (2023). Implementation of the presidential directive on national tree growing and restoration campaign, Circular No.17/2023. Retrieved from <https://cabinetaffairs.go.ke/implementing-presidential-directive-national-tree-growing-and-restoration-campaign-mission>
- UN. (2021). COP26 The Glasgow Climate Pact, UN Climate Change Conference, UK 2021. Retrieved from <https://unfccc.int/process-and-meetings/the-paris-agreement/the-glasgow-climate-pact-key-outcomes-from-cop26>
- UNICEF Kenya (2017). Humanitarian Situation. Report Retrieved from https://www.unicef.org/sites/default/files/press-releases/media-UNICEF_Kenya_Humanitarian_SitRep_6_March_2017.pdf

