

**FACTORS INFLUENCING TEACHERS' USE OF SCHOOL GARDENS IN
SECONDARY SCHOOL TEACHING: A CASE OF CENTRAL REGION
SCHOOLS, MALAWI**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

The study was conducted to investigate Factors influencing Teachers' use of school gardens in teaching in secondary schools in central region of Malawi. Data were collected using a cross-section research design using a self-administered questionnaire, key informant interviews and Focus Group Discussions. Through a census, 64 respondents who comprised teachers from 7 secondary schools were involved in the study. Checklists of questions were used to collect information from Key informants, 7 school administrators, and 7 secondary school students. Data analysis used descriptive statistics with the aid of a Statistical Package for Social Sciences (SPSS) version 20. Data from key informant interviews and focus group discussion were analysed using thematic analysis. The study findings revealed that the type of subject one taught, attitudes of teachers, size of class, training in garden use, time for practical lessons and availability of resources for garden use were some of the factors that influenced teachers' use of the school garden for teaching. Availability of resources (inputs) and training, which were significant at 0.001 and 0.05, respectively, were the major factors that influenced teachers' use of school gardens. Agriculture and Biology were the subjects that most secondary school teachers in the study schools used the gardens for teaching. There is need for provision of proper training to teachers so that they are able to use the gardens properly in teaching.

DECLARATION

I, MASAUTSO ABRAHAM MNYANGA, do hereby declare to the Senate of Sokoine University of Agriculture that, this dissertation is my own work, done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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Date

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I would also thank God for allowing everything to go as it did.

DEDICATION

To my late brother, Maxford Mnyanga and late sister in-law, Stella Mpanga for setting the foundation on which I have built everything that I am today.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CDSS	Community Day Secondary School
ESR	Education for Self-Reliance
EU	European Union
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GoM	Government of Malawi
HIV	Human Immunodeficiency Virus
MoA	Ministry of Agriculture
MoAFS	Ministry of Agriculture and Food Security
MoE	Ministry of Education
MoEST	Ministry of Education Science and Technology
NSO	National Statistical Office
PBC	Perceived Behavioural Control
SMASSE	Strengthening Mathematics and Science in Secondary School
SPSS	Statistical Package for Social Sciences
STEM	Science, Technology, Engineering and Mathematics
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UMCA	Universities Mission to Central Africa

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

A school garden is a learning tool and strategy that allows teachers to incorporate hands-on activities in a diversity of integrative and standards-based lessons (Bice *et al.*, 2018). The school garden involves students by providing a dynamic environment in which to observe, discover, experiment and learn. It is where lessons from real life experiences rather than textbook examples are drawn, allowing students to become active participants in the learning process (Acharya, 2019; CSGN, 2006). A school garden is a living textbook (Hillova *et al.*, 2020). Food and Agriculture organization (FAO) defined school gardens as cultivated areas around or near schools and tended at least partly by students (FAO, 2010). School gardens, are used in teaching any subject like Science, Mathematics, Language and Arts. They also help teach responsibility, cooperation, character building, responsible eating, and care for nature (Acharya, 2019; Peal, 2017; Mukarami *et al.*, 2016).

1.1.1 Introduction of gardens in schools

Teaching has been confined to the four walls with little interaction with nature ever since education came into what we know it today. It has involved formal instruction through reading or book learning. At times, it has involved rote learning and memorisation of knowledge with little application outside the classroom (Acharya, 2016). The teacher has always been there to disperse knowledge to students. To change this status, some philosophers proposed a shift in the way teaching is carried out (Acharya, 2016).

Jean-Jacques Rousseau (1909) considered the father of child-centred education discussed the importance of nature in the growth and development of children. He criticised the

teaching methods then and advocated for a new way of teaching children. Jean-Jacques Rousseau proposed that in place of formal instruction in reading or book learning, children should be allowed to explore their physical environment, observe objects in nature and play games designed to enhance their sensory abilities (Maltese, 2014). At the same time an Italian educationist, Maria Montessori emphasized the importance of nature in education and recommended gardening as an activity for all students. She believed that classrooms should be designed so that children could move from the indoor environment to the outdoor environment fluidly. She observed that gardens had many physical socio benefits in that they could lead children to intellectual contemplation as well as awareness and appreciation for the environment in real life settings.

Dewey, an American philosopher, like Jean-Jacques Rousseau was against the teaching methods that were mainly teacher-centred. He wanted change from teacher-centred, fact-centred, recitation-based pedagogy to a pedagogy based on understanding of a child's thought process and their capacities to learn and use ideas in the context of real life problems. An ideal setting for children to observe and explore these real life problems was a school garden (Dewey, 1938). School gardens enable students to participate in real-life activities. School gardens provide an authentic site for experiential and inquiry based learning. Paulo Freire, a Brazilian philosopher, discouraged, the banking of knowledge by teachers in students, he advocated for practical learning, as he believed that was more effective (Freire, 1970).

1.1.2 School gardens in African schools

In Africa the use of school gardens in teaching was promoted by *Mwalimu Julius Nyerere* through his Education for Self-reliance policy (ESR) (Nyerere, 1967). He argued that what students learnt in the school should be relevant to the community. This approach

would ensure that students were more prepared to function in the community and the community benefitted from the students. Every school was to have a school garden which was to be used for teaching/learning processes. It is argued that gardens in schools give school-children the opportunity to grow and harvest their own fruits and vegetables (Lubeka *et al.*, 2021; Huys *et al.*, 2017). School gardens also exist in other African schools. They are found in South Africa, Kenya, Uganda, Malawi and other countries (Nalumu, 2021; Laurie, 2013). Studies in these African countries have shown that gardens are used as a source of food for school feeding programs, environmental sustainability, nutritional education and as a learning resource. On using the gardens for teaching in Tanzania, Ahmad (2015), found that the use of school gardens significantly improved learning.

1.1.3 School gardens in Malawi

From a personal experience: during my secondary school days in the 1990's each secondary school had a school garden that was used for agricultural experiments. The gardens were integrated into the secondary school curriculum meaning that its activities appeared on the official timetable and their assessment formed part of the official results for the student. The Agriculture teachers took charge of all garden activities. They made sure that the gardens were attended to in time according to the school calendar. The school took responsibility of providing inputs. The inputs included seeds, fertilizers and chemicals. The school was also responsible for providing implements like hoes. The gardens were mostly rain fed. Students would go and do assigned duties like making ridges, planting, weeding, fertilizer application and harvesting. All these activities formed part of the continuous assessment in the subject agriculture at both school and national examination levels. End of 1990's saw the decline

of the school gardens due to the change in the secondary school curriculum which did not put emphasis on agriculture as a subject in secondary schools.

The school gardens resurfaced in 2010's in the primary schools as part of the school feeding program. Ministry of Agriculture and Food Security (MoAFS) as cited by Engler and Kretzer (2014) in its paper highlighted the need/importance of school gardens within the education system to improve nutrition security for Malawi in the future. Urell *et al.* (2018) in their study of school gardens reported that the school gardens in Zomba district were established to produce food for the students in the school feeding program. The schools got inputs from the ministry of agriculture (MoA). The use of the school gardens varied from school to school. Some schools used them for teaching and learning while some did not. What needs to be known is why some schools used them for both food production and learning while other schools just used them for food production only.

1.1.4 School gardens in the central region schools in Malawi

School gardens especially in the primary section came to support the school feeding program. They were established as a way of sustaining the school feeding programme once the donors, World food Program (WFP) and others pull out. However, the establishment of school gardens in the secondary school section is slightly different from that in the primary section. The school gardens were established to assist needy students, supplement food for the boarding secondary schools and as a teaching and learning resource. The school gardens, if used for teaching and learning, offer experiential learning (Ahmad, 2014). However, teachers' involvement in the use of the school gardens in teaching in the schools with school gardens remains unknown.

1.2 Problem Statement

From the statements above it has shown that school gardens could play a major role as a teaching resource. Several studies have been done on school gardens. In a study by Nalumu *et al.* (2021) in Uganda, they researched on integration of school gardens in the school curriculum to help mitigate the climate change. They reported that some barriers or challenges existed to implementation of successful school gardens. Huys *et al.* (2017) in their study in Gent, Belgium, they looked at implementation of school gardens in limited spaces. In Malawi, Urell *et al.* (2018) in their study found that school gardens at primary school were used to produce food for the school feeding program and found very little use of the gardens on teaching and learning. However, these studies did not look at the role of the teacher in using the school garden in teaching. Therefore, this study looked at factors that influence teacher's use of school gardens in teaching in 7 selected secondary schools in central region of Malawi.

1.3 Justification of the Study

Understanding teacher's current use of school gardens in teaching will assist in changing their attitudes, the subject to use when using the garden, minimising their challenges and perceptions in using the school gardens in teaching. The study findings will also help the teacher training institutions in incorporating the gardens as a teaching resource.

1.4 Objectives of the Study

1.4.1 Overall objective

The overall purpose of this study was to assess factors that influence teachers' use of school gardens in teaching in central region secondary schools, Malawi.

1.4.2 Specific objectives

Specifically, the study aimed to:

- i. Determine the subjects that can use a school garden as a teaching resource.
- ii. Assess teachers' perception/attitudes of a school garden as a teaching resource.
- iii. Examine challenges that teachers' face in using school gardens as a teaching resource.

1.5 Research Questions

1. What subjects use the school gardens as a teaching resource?
2. What perceptions do teachers hold of school gardens as a teaching resource?
3. What challenges do teachers face in using school gardens for teaching?

1.6 Limitations of the Study

Data was collected during the peak of Covid-19 in Malawi and this affected respondent participation in the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Importance of School Gardens

Human history has shown that school gardens can produce food for humanity. Stewart (2014), in her study, discovered that school gardens helped to transform food systems in the United States of America (USA) by producing food for the nation during the Second World War. Urell *et al.* (2018) in their study on the use of school gardens in Zomba, south of Malawi discovered that, school gardens produced food for the school feeding program. Other studies have shown that gardens helped to teach children about local foods and recipes (Dos Santos, 2020).

School gardens have been a fertile ground for teaching agricultural practices to students and the community at large. In African schools, the school gardens have served to teach agricultural practices, as the students are likely to remain in rural life as adults (Stewart, 2014). Banda (1982), in his study on missionary education in Malawi reported that each mission had a demonstration plot, which it used to impart knowledge on agricultural practices to the local communities. The gardens taught the communities on how to grow various crops and how to raise various animals. Some people in the community after being introduced to school gardens had been inspired to start their own gardens (Passy *et al.*, 2010). Other studies have reported that the gardens are seen as a mechanism for vocational and skills training.

One major reason for establishing school gardens has been a teaching and learning resource. The school gardens are a teaching resource for any subject in the school. They are used in teaching science, mathematics, language, arts, character building and responsible eating (Acharya, 2019; Peal, 2017; Mukarami *et al.*, 2016). As long as a

garden is around a school it has some educational value, however, what matters is how involved is a teacher in that education endeavour.

2.2 Factors Influencing Use of School Gardens in Teaching

2.2.1 Subjects taught at secondary school level

Research shows that school gardens can act as a teaching resource at any level of education. According to California school garden network (2006), school gardens, encourage inquiry as students use their senses, reasoning and communication skills to find answers to questions. At secondary school level, gardens naturally fit in with sciences- it acts as a science laboratory. According to Mukarami *et al.* (2016) in their study found that school gardens can be used for teaching such subjects as science, mathematics, language and social studies. However, Smith (2014) just emphasised on science subjects as using the school garden as a teaching resource. This then means that some teachers fail to use the school garden because of the nature of the subject that they teach.

2.2.2 Perceptions

The perception or attitudes that one holds towards something determines how they behave or approach such a thing. The perceptions may determine whether teachers use the school gardens or not. A survey by Laurie *et al.* (2013) in South African revealed that 96% of teachers perceived gardening as helping to improve learners' health. While 11% of the teachers, perceived gardening as a low status activity. Rich and Ardoin (2014) came up with some perceptions that teachers have on school gardens. They stated that teachers perceived school gardens as places where students learn food-growing skills, improving nutrition, supporting academic achievements and offering environmental education. They also further gave these as the perceptions that teachers have, providing students with the opportunity to engage in hands-on learning about the environment, science and other

topics. Kucelin (2011), in her study, came up with the following as the perceptions that teachers hold on school gardens, educating children on healthy eating, food and nutrition, educating children on gardening and growing food and building a strong connection between local farms, schools and communities.

Stewart (2014), in her review of literature, discovered that principals viewed school gardens as moderately to very effective at enhancing Science subjects and the principals also viewed school gardens as not effective or slightly effective at enhancing school meal programme. These perceptions may affect how the principles or administrators support the garden activities.

2.2.3 Time

Time is one of the factors that influence teachers' use of the school garden in teaching. In a study by Passy *et al.* (2010), they discovered that time limited teachers' use of the school garden in teaching. Other studies (Mukarami *et al.*, 2016; Poole, 2016; Stewart, 2014) have all cited time as a challenge in using the school garden as a teaching resource. Time is a challenge when it comes to taking the students to the gardens. The students have to move from the class to the garden and back to the class. It costs time for a class to shift from a classroom to a garden and regain lesson focus and purpose. It also takes time to create and prepare focussed lesson plans for use in a garden (Poole, 2016). Teachers also need time to plan for lessons in the gardens. There is also need for time to take care of the gardens.

2.2.4 Training

The use of school gardens in teaching and learning requires special training. The ordinary training that teachers go through does not prepare them well for using the school gardens

as a teaching resource. In a study by Mukarami *et al.* (2016), it revealed that lack of proper training was one of the barriers to the use of school gardens in teaching and learning. Teachers lack knowledge in planning lessons around the school garden. They also lack knowledge in how to handle students in the garden. This lack of proper training leads teachers to not being interested in using the school gardens for teaching and learning.

2.2.5 Inputs

Inputs comprise of all the materials needed in running the school garden. They are seeds, chemicals, fertilizers and implements like hoes. The inputs help to make work easier in the garden. Donations from seed companies, nurseries and local businesses help in the availability of inputs in the school gardens (Stewart, 2014). Their lack may lead teachers not like to use the gardens for teaching, as the gardens will not be functional.

2.2.6 Water

Water is necessary for life. No crop or animal can survive without water. Availability of water for garden use determines the life of the garden. If water is not available then the garden will not function. This then means that during the dry season gardens can only function if there is a reliable source of water. If there is no reliable source of water then the garden can function during the rainy season only. This situation affects the use of gardens when water is not available.

2.2.7 School support

Support for garden use comes from fellow teachers, the community and school administrators. School administrators' and fellow teachers' willingness to support academic use of the garden determines how teachers use the gardens for teaching.

In a study by Poole (2016) it was discovered that lack of administrators' willingness affected use of school of school gardens. They could not make funds available for use in the gardens. This situation leads to the gardens not to function hence teachers fail to use them for teaching.

2.3 The study Gap

Information on the use of school gardens in teaching and food production is readily available, but specific information on factors affecting teachers in using the school garden in teaching is missing. Therefore, this study aimed at finding those factors as they apply to secondary school teachers in central region, Malawi.

2.4 Theoretical and Conceptual Framework

2.4.1 Theoretical framework

The Theory of Planned Behaviour (TPB) as proposed and advanced by Ajzen (1985) guided the study. Theory of Planned Behaviour is an extension of the Theory of Reasoned Action (TRA). According to this theory (TPB), human behaviour is a result of attitude, subjective norms and perceived behaviour control. Attitude is what one thinks about a behaviour, subjective norm is what others think about the behaviour and perceived behaviour control is whether one can do or carry out the behaviour or not. The attitude can either be positive or negative about the behaviour, subjective norm is whether other people approve or do not approve of the behaviour and perceived behaviour control is whether one has the ability to perform or carryout the behaviour or not. The theory of planned behaviour allows one to explain the likelihood that people will hold an intention to carry out a specific behaviour. Intention is the desire to perform a behaviour. It also provides for an understanding of the factors that lead to a behavioural intention. The theory is summarised in Figure 1.

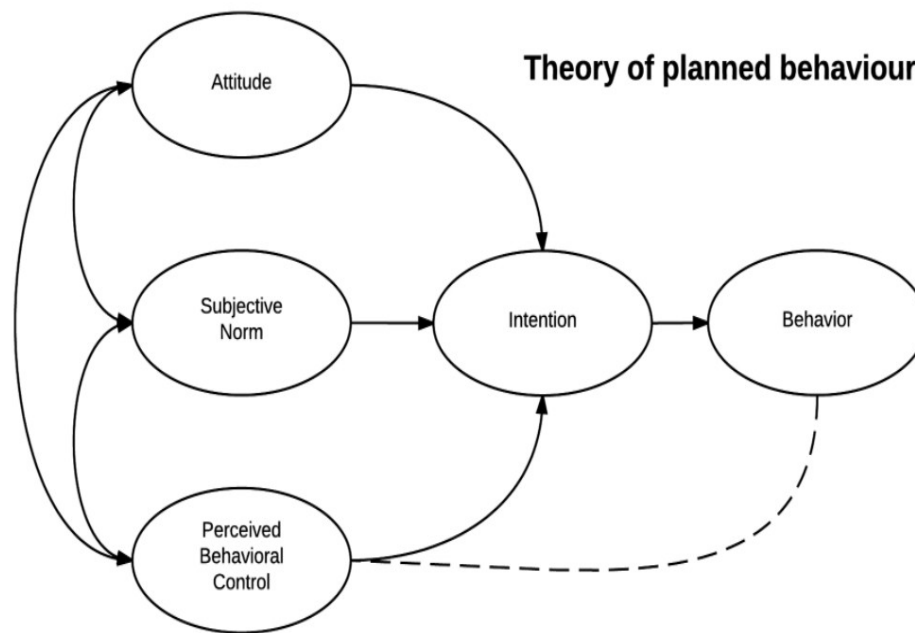


Figure 1: Theory of planned behaviour

Source: Ajzen (1985)

2.7 Conceptual Framework

According to Ajzen (1985), for behaviour to be carried out, there is need for an intention. Intention is a desire to perform a particular behaviour. The intention results from a person's attitudes, subjective norms and perceived behavioural control. The stronger the intention to engage in a particular behaviour the more likely should be its performance. The intention is under the volitional control, which is deciding at will to perform or not to perform a particular behaviour. Behaviour is the way in which one acts or reacts. For this study, behaviour is a way in which one uses the school garden in teaching/learning. The factors that influence behaviour are attitudes, subjective norms and perceived behavioural control (PBC). Attitudes: Is a settled way of thinking or feeling about something. The attitude can be positive, neutral or negative. Manifestation of attitudes is by the confidence, sense of responsibility, willingness to adapt, pessimism, doubt and feeling of being disconnected that one shows toward a behaviour.

Subjective norms: these are beliefs that an important person or group of people will approve or disapprove a particular behaviour. Influential people who may be important to a teacher in using a school garden for teaching/learning may include fellow teachers, administrators and students.

Perceived behavioural control: Presence of adequate resources and ability to control barriers to behaviours enhances performance of such behaviour. The more resources and fewer obstacles individuals perceive, the greater their perceived behavioural control and the stronger their intention to perform behaviours (Ajzen, 1985). In using a school garden as a teaching/learning resource, the following may be the resources; teacher's training, size of the class and experience in using school gardens as a teaching/learning resource. The conceptual framework is summarised in Figure 2.

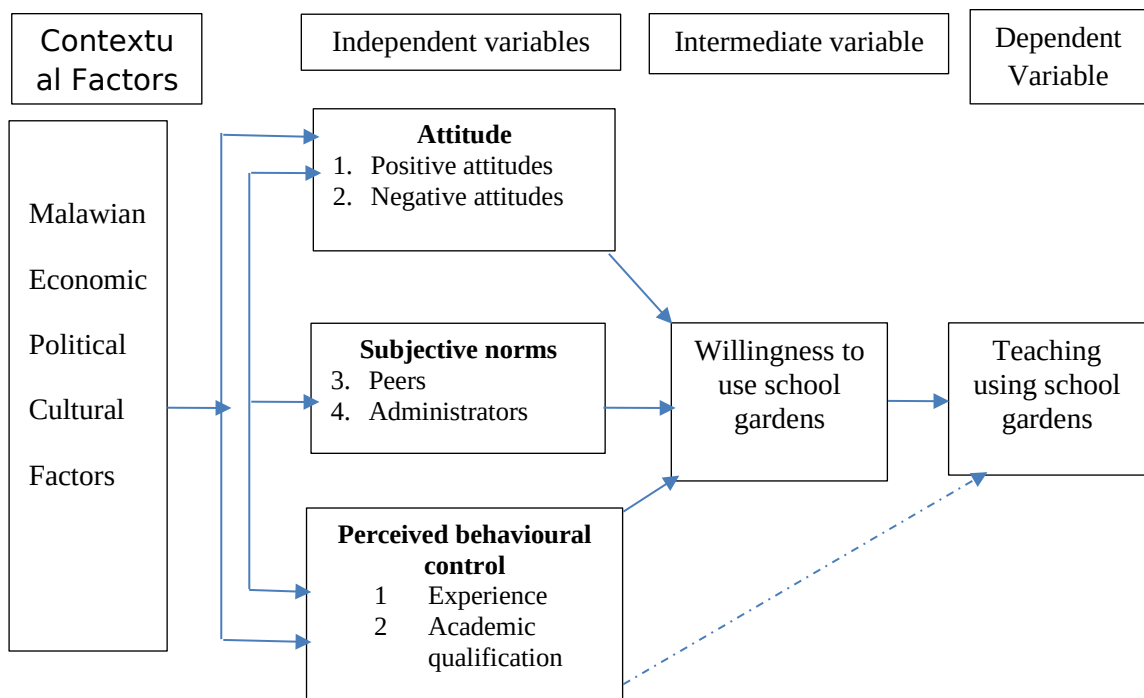


Figure 2: Conceptual framework for factors influencing teachers' use of school garden in teaching and learning in central region secondary schools - Malawi

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Overview

This chapter describes the research methodology used in the study. The chapter includes description of the study area, research design, sampling procedure, data collection methods and data analysis.

3.2 Description of the Study Area

The study was conducted in the Central Region of Malawi. The region covers an area of 35 641 km² and has a population of 7 523 340 (NSO, 2019). It is bordered to the north by the northern region, to the west by Zambia and Mozambique, to the south by the southern region and to the east by Lake Malawi as shown in Figure 3.

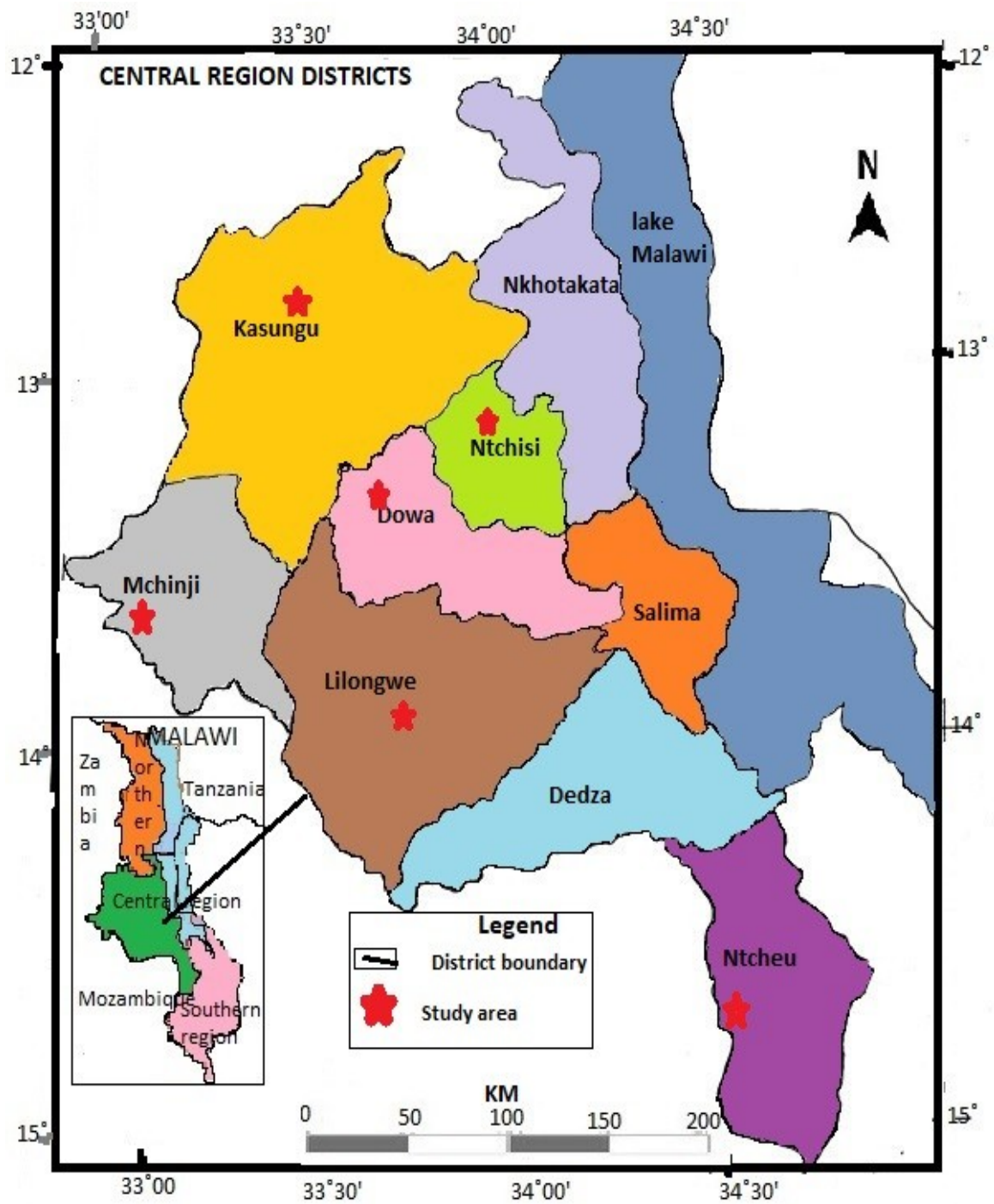


Figure 3: Map of Malawi showing the central region

The study covered two Education Divisions of Central East and Central West. Malawi's education administration is divided into divisions and districts. The divisions control what happens in most secondary schools, while the districts control mostly the primary schools and some secondary schools especially the Community Day Secondary schools (CDSS). There are six Education Divisions which are; North, Central East, Central West, South East, Shire Highlands and South West. Each division covers 4 to 6 districts. The Central Region covers the districts of Lilongwe, Mchinji, Dedza, Ntcheu, Kasungu, Salima, Dowa, Ntchisi and Nkhhotakota. The region has some secondary schools with active school gardens, it is these secondary schools that were targeted in this study.

3.3 Research Design

The study employed a cross-section survey research design. In this design, data is collected once at one point. By using this design, it means that the data collected were enough and the researcher will never go to the same population looking for the same information.

3.3.1 Description of the study population

Information was collected from teachers in the seven schools under study. The respondents comprised of all teachers both males and females in the schools. The respondents in the survey, taught various secondary school subjects and at different levels (form 1 to 4). Seven school head-teachers and seven students were selected for key informant interviews.

3.4 Sampling procedure and Sample Size

3.4.1 Sampling procedure

The central region was purposely selected as it has some secondary schools with active school gardens. Purposive sampling is done depending on the availability of the population of interest, time and other resources. Tsangano, Chimteka and Ngowe CDSS were selected because in these schools there was a school project that involved establishment of school gardens. The researcher was sure to find the gardens active. Loyola, Mbomba and Kasakula secondary schools were selected because the head-teachers for these schools initiated their establishment.

3.4.2 Sample size

The study population included all secondary school teachers from schools that had active school gardens in the Central Region. The population of teachers in the schools was about 100. Because the number was manageable all the teachers in the selected schools formed part of the respondents in the survey. Finally, a total of 64 respondents took part in the survey. According to Bailey (1994), an acceptable minimum number of respondents for statistical analysis is 30 as such 64 respondents that took part in the study was large enough for any statistical analysis. Many teachers did not participate in the survey due to Covid-19. This was the peak period for Covid-19 cases in Malawi. The schools were closed and teachers were operating from their homes. To get teachers participate in the survey, calls were made to different Head-teachers prior to going to collect data. A day would be agreed upon and the researcher would go to collect data.

To collect data from the students, it involved Head-teachers identifying the students on behalf of the researcher. A WhatsApp voice call was made and the students answered all the questions meant for them. All this was because there was a ban on meetings in the

country due to Covid-19. The other reason for the low participation was that other teachers had gone to mark the national examinations.

3.4.3 Data collection instruments and type of data

Primary and secondary data were collected using two types of instruments which are Interview schedule and checklist questions.

3.4.4 Primary data

Primary data was collected from teachers who were in the 7 secondary schools. The instrument used was a sixty-four itemed questionnaire, which had both open and closed ended questions. The interview schedule was pre-tested on ten teachers from Youth care Ministries private secondary school. The aim of pre-testing was to judge if the questions were clear, specific and pertinent to the study objectives. The teachers involved in pre-testing did not form part of the survey group to avoid contamination. The results showed that the interview schedule needed some adjustments. An interview checklist was used to collect data from the key informants.

3.4.5 Secondary data

Secondary data both published and unpublished sources were collected from various sources like books, websites, journals, theses and from SUA library.

3.4.6 Validity

Validity is the degree to which results from analysis represents the concept under investigation (Taherdoost, 2016). To achieve the desired results, each instrument was validated with some members of staff at Sokoine University of Agriculture (SUA) department of Extension and Community development. The instruments were also

discussed with some members of staff at Natural Resources College (NRC). The comments from the discussions were used to improve the data collection instruments.

3.4.7 Reliability

Reliability refers to the stability of the instrument over time (Taherdoost, 2016). To test for the reliability of the questionnaire, 10 teachers from Youth Care ministries responded to the questionnaire. The recommended sample for pilot testing is between 1-10 per cent of the target sample/population (Mugenda and Mugenda, 1999). All inconsistencies were corrected before being administered to secondary teachers in the study schools.

3.5 Data Collection Methods

To collect reliable data, the study employed different data collection methods/instruments. The study collected both quantitative and qualitative data. The following data collection instruments were used; seven school administrators were interviewed as key informants. The school administrators refer to anyone holding the position of the school Head teacher, Deputy Head teacher or Head of Department. Seven students were also interviewed as key informants. The interviews with Head teachers were conducted on the same day that the questionnaire was administered to teachers. The information collected was used to corroborate what teachers said in their questionnaire and focus group discussions (FGDs). Interviews with students were carried out two days after visiting their respective schools. The information collected was used to corroborate teachers' responses.

Two focus group discussions (FGDs) took place with teachers teaching science subjects, like Agriculture, Biology, Mathematics and Chemistry. The groups consisted of 7 members each of mixed sex. One group had four males and three females while another

group had five males and two females. Availability of the teachers on the day of the interviews determined the proportions of the groups. The first FGDs took place at Mbomba secondary school on 10th February 2021 and second one took place on 15th March 2021 at Ngowe CDSS. The FGDs were meant to bring a deeper understanding of what was answered on the questionnaire.

A self-administered questionnaire was used on all teachers in the participating schools. The questionnaire contained four sections. Section 1 solicited general information on sex and qualifications. Section 2 required information to answer objective 1. Section 3 solicited information on objective 2 and the last section solicited information on objective 3.

3.6 Data Analysis

Quantitative data was analysed descriptively with the aid of SPSS version 20. The results gave percentages. Pearson's coefficient of correlation was used to come up with relationships among variables. The Binary Logistic Model was employed to come up with factors that have a significant influence on the use of school gardens as a teaching resource. Binary logistic model was used because it explains well when the dependent variable is dichotomous. Hence using or not using school gardens in teaching. Qualitative data was analysed using themes. Themes were generated by combing all similar statements together and then analysing them.

$$\log \frac{p}{1-p} = \beta_0 + \beta_i \sum_i^N X_i + \dots \dots \dots \mathcal{E} i$$

Where

Log = Natural log

P = Probability of using the school garden for teaching.

1-P = Probability of not using the school garden for teaching

β_0 = Intercept of the equation

β_i - β_n = Coefficient to be estimated

X_1 - X_n = Independent variables

X_1 = Attitude towards using or not using a school garden for teaching.

X_2 = Peers' pressure to use or not to use a school garden for teaching.

X_3 = Teachers training.

X_4 = Administrators support or not support use of school garden for teaching.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This chapter presents findings and discussion of the study. The chapter is presented as follows; socio-demographic characteristics of the respondents and factors influencing use of school gardens in teaching.

4.1 Socio-Demographic Characteristics of Respondents

This section presents background information of the respondents, which include sex, academic qualifications and length of service in teaching.

4.1.1 Sex

Respondents indicated their sex on the self-administered questionnaire. Findings (Table 1) show that out of the 64 teachers 81% were males. This implies that there were very few female teachers in the secondary schools under study. The findings are in line with a study conducted by Marphatia *et al.* (2010), who discovered that sub-Saharan Africa has less than 50% female teachers at all levels of the education sector.

The findings (Table 1) show that there were two female teachers in Community Day Secondary Schools (CDSS) compared to 10 in boarding secondary schools (BSS) and 22 male teachers in CDSS compared to 30 in boarding secondary schools. The results have shown the gender gap that is there in the distribution of teachers in the schools under study. The study findings are in line with a study by Kadzamira (2006) who found that four out of five female teachers at both primary and secondary schools in Malawi teach in urban schools. The rural schools may not have the necessary amenities to attract female teachers.

4.1.2 Academic qualifications

The study findings (Table 1) showed that the teachers held different academic qualifications. Some teachers, 48%, had bachelors' degree in Education followed by 38% who had a Diploma in Education while 13% held a Primary school teaching certificate and 2% other qualifications. A primary school teaching certificate holder is under-qualified to teach at secondary school level. The introduction of free primary education in 1994 created a teacher shortage at all levels of primary and secondary school. Due to shortage of qualified teachers, primary school teachers were allowed to teach at secondary school level to reduce this problem. The government therefore moved some primary school teachers to teach at secondary schools especially in community day secondary schools (CDSS).

4.1.3 Teachers duration of service in teaching

The minimum length of service for the respondents was one (1) year and maximum teaching years was 27 years. The mean years of service were 10 years and the standard deviation was 6.3. The findings (Table 1) show that 40% of the teachers are those that had been in the service between 6 and 10 years followed by those (25%) that had been in the service for 1 to 5 years. The findings further show that only two percent (2%) of the teachers had served for more than 26 years. These findings imply that most (65%) teachers had served less than 10 years. Most of the teachers were in their youth age and had short length of service in teaching. The research findings are in line with the findings by Turkoğlu *et al.* (2017) in Istanbul who found that teachers' length of service ranged from 1 year to 29 years.

Table 1: Distribution of teachers based on demographic characteristics (n=64)

Sex	N	%
Male	52	81.0
Female	12	19.0
Total	64	100.0
Community Day Secondary School		
Male	22	92.0
Female	2	8.0
Total	24	100.0
Boarding Secondary School		
Male	30	75.0
Female	10	25.0
Total	40	100.0
Qualifications of teachers		
Primary School Teaching certificate	8	12.0
Diploma in Education	24	38.0
Bachelor's Degree in Education	31	48.0
other qualification	1	2.0
Total	64	100.0
Length of Service in Teaching		
1-5 Years	16	25.0
6-10 Years	26	40.0
11-15 Years	10	15.0
16-20 Years	8	13.0
21-25 Years	3	5.0
26-30 Years	1	2.0
Total	64	100.0

4.2 Factors Influencing/Affecting Use of School Gardens

4.2.1 Subjects taught using school gardens

To determine how subjects that one taught at secondary school level affected their use of school gardens, nine (9) questions were presented to the respondents. Respondents were required to indicate whether they used the school gardens for teaching or not. Those who answered “YES,” were further required to indicate the subjects taught using school gardens and how they used the school gardens in teaching. Those who responded “NO”

were required to explain reasons for their positions. To collaborate the findings, focus group discussions were conducted.

4.2.1.1 Subjects taught using school gardens in central region secondary schools

The research findings (Table 2) show that more than half (53%) used the school gardens for teaching. This implies that many teachers used the school gardens for teaching in various subjects. The findings further revealed that 53.0% of teachers, who used the school gardens for teaching, used it in teaching Agriculture, while 21.0% used it in teaching Biology and another 12% used it in teaching Mathematics (Table 2). These findings imply that indeed school gardens were used to teach various subjects. The findings also imply that the subject that one taught determined their use of the garden. The findings from the focus group discussions (FGD) conducted on 10th February at Mbomba secondary school in Ntchisi district and Ngowe secondary school in Lilongwe on 15th March 2021 concluded that teachers used the school garden as a teaching resource to teach any subject. The teachers gave the following subjects: Agriculture, Biology, Chemistry, Mathematics, Home Economics, Life skills and Geography. Findings from the interviews with students showed that indeed teachers used the school gardens. One student responded that teachers used the school gardens whenever they taught subjects like Agriculture and Biology.

“We usually go to the garden when we are having an Agriculture or Biology topic”. (Female student, Ngowe CDSS, Lilongwe, 18th March 2021. Key informant)

The findings are in line with the findings by Mukarami *et al.* (2016), who found that school gardens were used to teach subjects like, Science, Mathematics, social studies and

language. These findings are also in tandem with those found by Poole (2016) who discovered that school gardens could be a rich resource for teaching Science Technology Engineering and Mathematics (STEM) subjects due to the school garden's nature of being hands-on. The list of subjects given during the FGDs, Agriculture, Biology, Chemistry, Mathematics and Home Economics are all STEM subjects. The interviews with students also revealed that the gardens were only used whenever there was a topic that required their use. This is not surprising, as teachers have to decide what resources to use for a particular topic or subject.

In order to understand why some teachers did not use the school gardens for teaching, a space was provided so that the teachers would explain. The responses were grouped according to their themes. The results showed that the nature of the subject limited them to use the school garden in teaching. They explained that their subjects did not require the use of a school garden in their teaching. One teacher responded,

“Personally I am not using school gardens because for me they are not relevant to the subject I am teaching” (A Male teacher, Tsangano CDSS, Ntcheu, 17th Feb 2021).

This was a response from a teacher who teaches Geography and Bible Knowledge. Another teacher responded,

“The nature of the subjects does not demand learners to use the school garden.” (A Male teacher, Tsangano CDSS, Ntcheu, 17th Feb 2021).

These responses are in contrast to the results by Mukarami *et al.* (2016) who found that school gardens could be used to teach any subject. These findings show that the subject that one teaches influences whether they use the gardens for teaching or not.

Table 2: Distribution of teachers based on use of school gardens in teaching and learning

The use of school gardens in teaching (n=64)	n	%
Did not use school garden	30	47.0
Used the school garden	34	53.0
Total	64	100.0
Subjects taught using school gardens (n=34)		
Agriculture	18	53.0
Biology	7	21.0
Geography	4	12.0
Mathematics	4	12.0
Home Economics	3	9.0
English	3	9.0
Chemistry	2	6.0
Chichewa	1	3.0
Social Studies	1	3.0
Life Skills	1	3.0
Physics	1	3.0
When teachers use the school gardens in teaching (n=34)		
In a practical topic	15	43.0
As a reference material	21	63.0
When faced with a difficult topic	9	26.0
To make students active	12	34.0

4.2.1.2 Sex of teachers and the subjects taught

In order to understand how different teachers based on sex used the school garden in teaching, cross tabulations were done. Findings (Table 3) show that; of the 12 female teachers, only four (33.0%) compared to 30 (58.0%) of the 52 male teachers used the school gardens for teaching. The findings, (Table 3), further show that no female teacher used the school gardens to teach Biology, Chemistry, Mathematics and Home Economics. The results also show that although male teachers used the school gardens in teaching and

learning, very few used them to teach Biology, 23.0%, Mathematics, 13.0% and Home Economics 10.0%, (Table 3). The results imply that very few female teachers use the school gardens compared to male teachers. Several reasons may be speculated. The female teachers may not like to work in the dirty gardens. The findings further show (Table 3) that more female teachers, 75.0% used the school gardens for practical lessons compared to 70.0% of male teachers who used the school gardens for practical lessons. More female teachers, 50.0%, referred to the school gardens in their teaching compared to only 27.0% of males who referred to the school gardens in their teaching, (Table 3). The results imply that female teachers like to use the school gardens for practical lessons compared to male teachers. During the focus group discussions, it was concluded that both male and female teachers use the school gardens in practical lessons.

Table 3: Distribution of teachers based on sex and subjects taught (n=34)

	Female		Male	
	n	%	N	%
Using school gardens in teaching	4	33.0	30	58.0
Subjects taught using school gardens				
Agriculture	2	50.0	16	53.0
Biology	0	0.0	7	23.0
Chemistry	0	0.0	2	6.0
Mathematics	0	0.0	4	13.0
Home Economics	0	0.0	3	10.0
English	1	25.0	2	6.0
Using the school garden for practical lessons	3	75.0	21	70.0
Using the school garden for reference purposes	2	50.0	8	27.0

4.2.2 Academic qualifications of teachers and subjects taught

The findings show that the highest number of teachers, 88.0% who used the school gardens as a teaching resource held the Primary School Teaching certificate, followed by

those who held Bachelors' Degree, 48.0% and only 46.0% of the Diploma holders used the school gardens as a teaching and learning resource (Table 4). The findings imply that the background of the teachers may explain this trend. The curriculum of the primary school is student-centred in its approach, meaning that students are at the centre of learning. Therefore, those holding primary teaching certificate may find using the school garden in teaching easier. The findings also imply that the teacher training that the secondary school teachers go through does not equip them with necessary skills to use school gardens as a teaching resource.

Table 4: Distribution of teachers based on academic qualifications and use of school gardens

	P		D		B		Other	
	n	%	n	%	n	%	n	%
Use of school garden in Teaching	7	88.0	11	46.0	15	48.0	1	100.0
Subjects taught using school gardens								
Agriculture	5	71.0	6	55.0	6	40.0	1	100.0
Biology	2	29.0	1	9.0	3	20.0	1	100.0
Chemistry	0	0.0	1	9.0	1	6.0	0	0.0
Mathematics	2	29.0	0	0.0	2	13.0	0	0.0
Home Economics	0	0.0	2	18.0	1	6.0	0	0.0
Time for using the school gardens in teaching								
During practical lessons	3	43.0	7	64.0	5	33.0	0	0.0
For referencing	4	57.0	5	45.0	11	73.0	1	100.0
During a difficult topic	2	29.0	5	45.0	2	13.0	0	0.0
To make students active	3	43.0	4	36.0	5	33.0	0	0.0
How the school gardens are used in teaching								
Practical lessons	5	29.0	9	82.0	10	67.0	0	0.0
Reference purposes	4	57.0	7	64.0	12	80.0	1	100.0

Key: P= Primary Teaching certificate, D= Diploma in Education, B= Bachelors' Degree in Education and Other= other academic qualifications.

4.2.2.1 Length of service in teaching and subjects taught

The findings show that of the teachers who used the school gardens for teaching and learning, 65.0% were those that had served between 11 year and 15 years. The findings show that 15.0% of those who taught using the school garden were those who had served between 1 and 5 years, (Table 5). These findings imply that more teachers (65%) who have served between 11 and 15 years are more enthusiastic to use the garden in teaching. This may be explained that at this time these teachers are more willing to explore use of other teaching resources in their classes as compared to when they are just new in the teaching profession.

Table 5: Distribution of teachers based on length of service and subjects taught

	1-5 years		6-10 years		11-15 years		16-20 years		21-25 years		26-30 years	
	n	%	N	%	n	%	n	%	n	%	n	%
Use of gardens for teaching	5	31.0	16	62.	6	60.0	4	50.	2	67.0	1	100.
Subjects taught using school gardens												
Agriculture	2	40.0	7	44.	5	83.0	3	75.	0	0.0	1	100.
Biology	2	40.0	3	19.	0	0.0	1	25.	1	50.0	0	0.0
Geography	0	0.0	3	19.	0	0.0	0	0.0	1	50.0	0	0.0
Chemistry	1	25.0	1	6.0	0	0.0	0	0.0	0	0.0	0	0.0
Home Economics	0	0.	2	13.	1	17.0	0	0.0	0	0.0	0	0.0
Mathematics	0	0.0	2	13.	1	17.0	1	25.	0	0.0	0	0.0
Physics	0	0.0	0	0.0	1	17.0	0	0.0	0	0.0	0	0.0
English	1	20.0	2	13.	0	0.0	0	0.0	0	0.0	0	0.0
Chichewa	0	0.0	1	6.0	0	0.0	0	0.0	0	0.0	0	0.0
Social Studies	0	0.0	1	6.0	0	0.0	0	0.0	0	0.0	0	0.0
Life Skills	0	0.0	1	6.0	0	0.0	0	0.0	0	0.0	0	0.0
Time for using the school gardens in teaching												
During practical lessons	3	60.0	7	44.	3	50.0	2	50.	1	50.0	1	100.
For referencing	2	40.0	9	56.	5	83.0	3	75.	1	50.0	1	100.

			19.			25.		100.	
During a difficult topic	1	20.0	3 0	3	50.0	1 0	1	50.0	1 0
			46.						
To make students active	2	40.0	5 0	3	50.0	0 0.0	1	50.0	0 0.0
How the school gardens are used in teaching									
			88.			50.			
Practical lessons	3	60.0	14 0	5	83.0	2 0	0	0.0	0 0.0
			63.			75.		100.	100.
Reference purposes	3	60.0	10 0	5	83.0	3 0	2	0	1 0

4.2.3 Teachers' Perceptions of School Gardens as a Teaching Resource

To capture the perceptions of the respondents towards using the school gardens as a teaching resource, 14 attitudinal statements were presented to the respondents. Five points Likert scale was used to measure attitude. The respondents were required to show their attitude, by specifying whether they strongly agreed (5), agreed (4), neutral (3), disagree (2) and strongly disagree (1). Later, strongly agree and agree were combined to become agree and was scored as three (3), strongly disagree and disagree were combined and became disagree and was scored as one (1) while neutral was scored as two (2). If one agreed with each of the 14 statements, he/she would get a score of 42 (3×14), and if one disagreed with each of the 14 statements, he/she would get a score of 14 (1×14) and if he/she was neutral or undecided, they would get a score of 28 (2×14). The scores for each individual respondent were combined to give a score range of 14 to 42. If a respondent had a score above 28, he/she had a positive attitude and if a respondent had a score of 28, they had a neutral attitude or undecided and if a respondent had a score below 28, he/she had a negative attitude towards use of school gardens as a teaching resource.

4.2.3.1 Respondents' general attitude of school gardens as a teaching resource

The study findings show that 59.0% of the teachers had a positive attitude (Table 6). The findings further show that 12.0% of the teachers were undecided on the use of school gardens as a teaching resource while 28.0% of the teachers had a negative attitude toward a school garden as a teaching resource. These findings imply that many teachers were ready to use the school garden as a teaching resource. During FGDs, respondents mentioned that school gardens helped to prepare students for life after school.

Table 6: Distribution of teachers based on their attitude towards school gardens as a teaching resource

Attitude	n	%
Positive	38	59.4
Neutral	8	12.5
Negative	18	28.1
Total	64	100.0

The study findings are in line with a study by Kincy *et al.* (2016) who found that teachers' positive attitude promoted the use of school gardens. A study by Huys *et al.* (2017) also found that key members and children in their study had a positive attitude towards school gardens.

4.2.3.2 Statement-wise analysis of teachers' perceptions of school gardens as a teaching resource

To understand the specific attitudes to specific statements, a statement-wise analysis was carried out. The mean score for each statement was obtained by adding the weights given to the statements by respondents divided by the total number of respondents. The mean score was worked out for each statement and assigned a rank based on the mean score obtained. Scores for negative statements were reversed to make sense, therefore although they were negatively stated their interpretation was based on the positive connotation.

The study findings (Table 7) show that the highest mean score of 2.7 was obtained for the statement "*Pupils are more creative in the school gardens than in the classroom.*" This means that students are able to create new things in the school gardens. The students' creativity is in the way they design the nursery beds. The second highest statement was "*Teaching in the school garden is exciting.*" The lowest ranked statement was "*Using a school garden for teaching is a form of punishment.*" This implies that teachers do not regard the school gardens as a ground for punishing students but for

teaching. During interviews with students, it was mentioned that a school garden was not used as a punishment ground. However, one student said.

“If I am made to work in the garden after doing something wrong in class then I will be forced to believe that the garden was established as a ground for punishment. If there is a proper duty roster for garden work then, that is okay with me.” (Female student, Ngowe CDSS, Lilongwe, 18th March 2021. Key Informant)

Table 7: Distribution of teachers based on statement-wise analysis of teachers attitudes of school gardens as a teaching resource

Statement	Agree (3)		Neutral (2)		Disagree (1)		Total score (TS)	Mean score (MS)	Rank
	n	%	n	%	N	%			
Pupils are more creative in the school garden than in the classroom	50	78.0	11	17.0	3	5.0	175	2.7	1
Teaching out in the school garden is exciting	48	75.0	11	17.0	5	8.0	171	2.7	2
I like using the school garden as a reference when I am teaching	37	58.0	19	30.0	8	13.0	157	2.5	3
Pupils learn to work in groups more in the school garden than in classroom.	38	59.0	13	20.0	13	20.0	153	2.4	4
Pupils learn more in the school garden than in the classroom.	38	59.0	12	19.0	14	22.0	152	2.4	5
I can use School gardens in teaching any subject	39	61.0	8	13.0	17	27.0	150	2.3	6
I like using the school garden for practical lessons	34	53.0	18	28.0	12	19.0	150	2.3	7
I feel that Pupils have more work that is practical in the school garden than in the classroom	33	52.0	18	28.0	13	20.0	148	2.3	8
Pupils learn to be patient in the school garden	28	44.0	19	30.0	17	27.0	139	2.2	9
Teacher training prepared me for the use of school garden in teaching/learning.	27	42.0	15	23.0	22	34.0	133	2.1	10
Teaching in the school garden is time consuming	24	38.0	6	9.4	34	53.0	118	1.8	11
The dirty in the school garden stops me from using the school garden as a teaching resource.	4	6.3	10	16.0	50	78.0	82	1.3	12
A school garden is dirty so I do not like to use it for teaching/learning	2	3.1	10	16.0	52	81.0	78	1.2	13

Using a school garden for teaching is a form of punishment to students	3	3.7	6	9.4	55	86.0	76	1.2	14
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The study findings are in line with a study by the California School garden Network (2006) which revealed that students can learn creativity in the school garden. Students may design the garden layout, do some colour games on the garden and make music instruments from garden produce.

4.2.4 Time allocated for practical lessons

In order to capture the time allocated for use in the school garden, teachers were asked to indicate how much time they had for practical lessons. The findings (Figure 4) show that 82.0% of the teachers had 80 minutes for practical lessons. The findings further show that 17.0% of the teachers had 40 minutes for practical lessons. The findings imply that time for working in the school garden is not enough and this restricted them from using the school garden for teaching. For subjects like Agriculture and Biology, they were allocated one double period per week. During FGDs, it was discovered that the time allocated for practical lessons is not enough to work in the school garden without disturbing other classes. One teacher, said.

“To get students organised to work in the school garden takes a lot of time. You have to make sure that the tools are ready. Students have to move from class to the garden and back. I asked that my practical lessons should be last on the time timetable so that even if time has run out it doesn’t disturb other teachers.”

(A Male teacher, Mbomba SS, 10th February 2021. FGD)

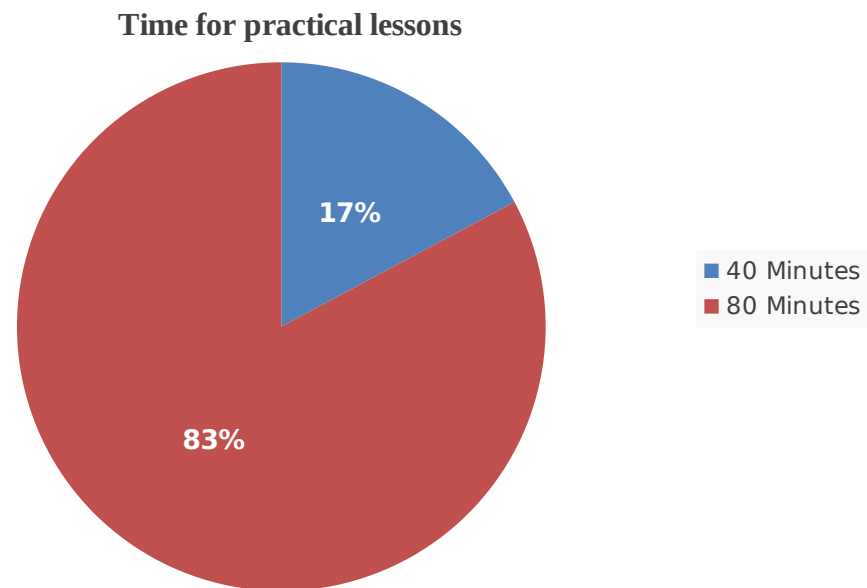


Figure 4: Distribution of teachers based on time for practical lessons.

The findings are in line with the results that Stewart (2014), Mukarami *et al.* (2016) and Poole (2016) found in their studies. They found that teachers need time to prepare for lessons, movement of students from class to gardens and back and time for caring the gardens.

4.2.5 Class size

In order to understand the effect of class size on the use of school gardens in teaching, each respondent was asked to indicate their class size. Then after, the class sizes were grouped for easy analysis. The study findings (Table 8) show that class size ranged from 36 to 150 students. The average class size was 67 students. This is a very a large class size for one teacher one to handle. The findings further show that 51.6% of the teachers teach in classes that have 36 and 60 students. Only 4.7% of the teachers teach in classes that have between 121 and 150 students. The findings imply that there is overcrowding in the classrooms and eventually in the school gardens. This then means that teachers are unable to handle these large classes and may eventually not feel like using the gardens as a teaching resource.

The average garden size for the schools under study was 1.5 acres, which translates into an average of 44 students being present in the garden at once. This implies that too many students may be present in the school garden at once. During FGD, held at Mbomba and Ngowe one of the teachers said large classes affect how they use the school gardens in teaching. Some teachers gave some of the problems that they face in using school gardens with such large numbers. One teacher said,

“Supervision becomes a problem.” (Female teacher, Mbomba SS, 10th February 2021, FGD)

Another teacher said,

“Not all students actively participate in the lesson, the number of tools to use in the school garden are not enough.” (A Male teacher, Mbomba SS, 10th February 2021. FGD)

Table 8: Distribution of teachers based on class size (n=64)

Class size	n	%	Mean
30-60	33	51.6	67
61-90	18	28.1	
91-120	10	15.1	
121-150	3	4.7	

4.2.6 Training on use of school gardens

In order to understand whether the teachers had ever attended a training specifically on the use of school garden, teachers were required to answer some questions. The findings (Table 9) show that only 12.0% of the teachers attended a training specifically on the use of school gardens. The findings further show that the training covered areas like “How to establish a school garden,” 4.0%. “Management of the school garden” 9.0% and “Teaching and Learning” 4.0%. The findings imply there is a great need to train the teachers on the use of school gardens as a teaching resource. During the FGDs teachers

lamented on the lack of training on the use of the school garden in teaching. One teacher said:

“I just use the school gardens blindly I wish I could be trained on how to use the school garden as a teaching resource.” (A Male teacher, Ngowe CDSS, 15th March, 2021).

Table 9: Distribution of teachers based on training.

Training	n	%
Attended training	8	12.5
Coverage		
How to establish a school garden	3	4.7
Management of a school garden	6	9.4
Teaching and learning	3	4.7

These results are in line with a study by Mukarami (2016) who found that there is lack of proper training on the part of teachers. Teachers lack knowledge in planning lessons around the school garden.

4.2.7 Availability of resources for use in the school gardens

To capture how resources influence teachers’ use of the school garden in teaching, teachers were required to indicate which resources are easily available. The resources were divided into inputs and implements.

The findings (Table 10) show that 36.0% of the respondents consider availability of fertilizer for garden use as a challenge. The findings further show that 31.0% of the teachers consider availability of insecticide as a challenge and 12.0% of the respondents consider availability of seeds for use in the school garden a challenge. These findings imply that to run a school garden requires the availability of these inputs. Findings from

interviews with administrators showed that availability of resources is a challenge.

One key informant had to say;

“We need fertilizer, vegetable seeds and other inputs for the smooth running of the school garden. Insecticides are a challenge to get especially during the rainy season as they are more needed when there is high pest attack on our vegetables.” (A Head teacher, Mboma SS, 10th February 2021).

The findings (Table 10) show that 23.4% of the teachers consider availability of hoes for use in the school garden a challenge. While another 8.0% consider availability of rakes a challenge. The findings imply that the school gardens under study lack basic tools for use by the students when in the gardens. It also implies that with lack of tools teachers may be discouraged to use the school gardens for teaching. For example, a hoe is a basic tool that every school garden must have. Findings from FGDs conducted at Mbomba and Ngowe showed that availability of tools for use is a challenge, one teacher said;

“Imagine for a class of 40 students you only have 10 hoes. How do you work with such a small number of implements? It will take the whole day for all the students to work on their small plots” (A Female teacher, Ngowe CDSS, 15th March, FGD)

Table 10: Distribution of teachers based on availability of resources (n=64)

Input	n	%
Seeds	8	12.5
Fertilizer	23	35.9
Insecticide	20	31.3
Implements		
Rakes	5	7.8
Hoes	3	4.7
Pipes	15	23.4

The study findings are in tandem with the results found by Stewart (2014). In her study, she discovered that availability of seeds was a challenge. Her study recommended that seed companies close to the school gardens should donate seed to the school gardens. She further recommended that local businesses donate resources to the school gardens.

4.2.8 Source of water for use in the school garden

In order to understand how the school gardens access water for use, teachers were asked to indicate their source of water. Findings (Table 11) show that 92.0% of water for use in the school garden is from rainwater. This implies that most gardens are rain-fed. The findings further show that 64.0% of the water for use in the school garden come from borehole and tap water (32.8%). However, rainwater is seasonal. To overcome the water challenge, most gardens had pumps that pump water into tanks so that they can use to irrigate the gardens when it is dry. The CDSS visited had a solar pump and a 5000L capacity tank installed. One key informant had this to say on the availability of water for the school garden:

“The solar pump we have is not enough to pump water for use in the whole garden. Some parts of the garden may go days without being watered. And imagine if the pump breaks down or is stolen, what will happen to our plants in the garden?” (A Head teacher, Ngowe CDSS, 15th March 2021).

Table 11: Distribution of teachers based on availability of water (n=64)

Source of water	n	%
Rainwater	59	92.2
Borehole	41	64.1
Tap water	21	32.8

4.2.9 Care of school gardens during school breaks

In trying to understand how school gardens are taken care of during school holidays, teachers were required to indicate who takes care of the school gardens during school holidays. The findings (Figure, 5) show that 93% of the teachers say that, casual labourers take care of the school gardens during holidays.

The findings further show that only 7% of the teachers say the community take care of the school gardens during school holidays. The findings imply that there is minimal community involvement in the running of the school garden. The gardens need care during the school holidays so that there is continuity. During the interviews with the school administrators, it was discovered that the school gardens are mostly taken care of by casual labourers. One interviewee said:

“To maintain the school garden, we rely on the casual labour, the community does not actively take part in the activities of the school garden, yet the garden is benefitting their children.” (A Head teacher, Kasakula CDSS, 25th February, 2021. Key Informant)

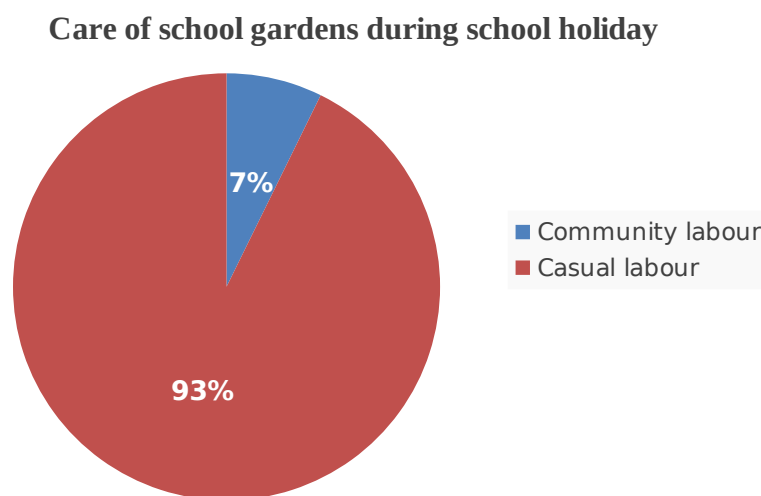


Figure 5: Distribution of teachers based on care of school garden during school holidays

These findings are in line with the results that Stewart (2014), found in her study. In her study, she discovered that the school gardens lacked the services of a full time coordinator of the garden or volunteers to help run the garden.

4.2.10 Teacher support in using the school gardens

In order to understand whether teachers get support in their use of the school garden, teachers were asked to name the source of their support. The findings (Figure, 6) show that many teachers (56.0%) received support from the school administrators. The results further show that 44.0% of the teachers got support from fellow teachers. The findings imply that, teachers were supported by both the school administrators and fellow teachers in using the garden as a teaching resource.

During the FGDs teachers said they support each other in using the school gardens.

On support from school administrators, one teacher said:

“To be honest, the administration is trying in supporting the activities of the school garden. They are buying all the inputs for the garden, paying for the casual labour and verbally encouraging us to continue using the school garden in our teaching.”

(A Female teacher, Ngowe CDSS, 15th March, 2021).

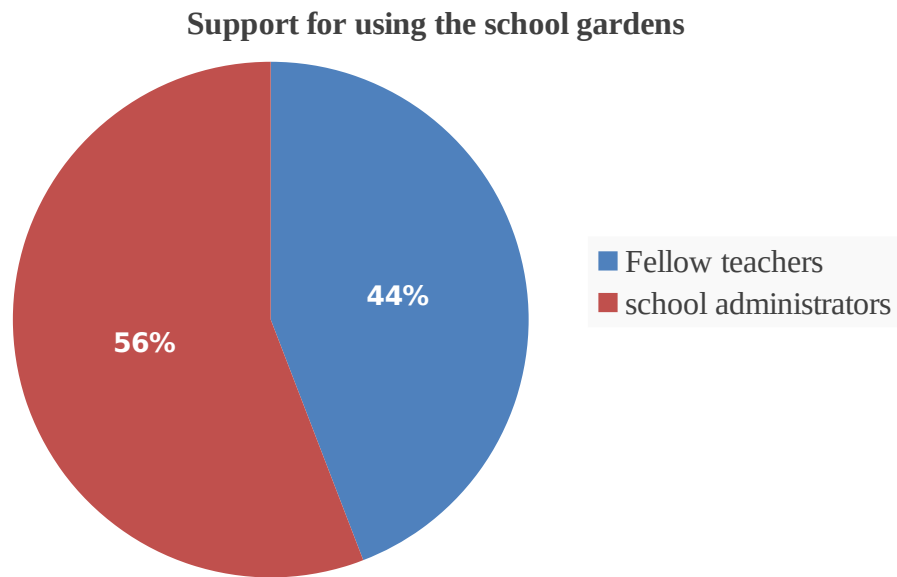


Figure 6: Distribution of teachers based on support on using the school gardens

4.2.11 Factors influencing use of school gardens in teaching

To come up with factors that have a significant influence on the use of school gardens as a teaching resource, a Binary logistic model was used. All factors (variables) (size of school garden, inputs, implements, availability of water for garden use, training and teacher support) were subjected to the model. After subjecting the various variables in the model, only two variables qualified for a well-fit model.

The findings (Table 12) show that inputs (odds ratio 6.64: $p < 0.00125$) and training (odds ratio 9.35: $p < 0.05$) had a significant influence on the teachers in using the school garden as a teaching resource. The findings imply that schools that had inputs being availed for their school gardens had odds of 6.64 more times likely to use gardens compared to those schools which were not supplied with any inputs.

The study findings further imply that training teachers on use of school gardens would likely increase their use of the school gardens in teaching by 9.35 times. During interviews with school administrators, it was discovered that inputs for the garden were needed to keep the school garden running smoothly. These findings are in tandem with a study by Mukarami *et al.* (2016) who cited proper training as one of the conditions for effective use of the school gardens as a teaching resource.

Table 12: Factors influencing use of school gardens

Variables	Odds ratio	Lower CI	Upper CI	P-Value
Inputs	6.6435	2.1985	22.3433	0.00125
Training	9.3523	1.3290	191.892	0.05
Size of school garden	1.6222	0.07155	18.7833	0.12627
Implements	2.3073	1.0045	10.6925	0.27200
Water	1.1560	0.5109	5.2329	0.85237
Teacher's Support	3.3970	0.74435	17.0576	0.11840

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

This study was conducted with the aim of examining factors influencing teachers' use of school gardens in teaching. Teachers considered for the study were those who taught at Tsangano CDSS, Mvera CDSS, Kasakula CDSS, Mbomba SS, Loyola SS, Ngowe CDSS and Chimteka CDSS in any subject.

The study addressed three objectives; determined the subjects taught using the school gardens, assessed the perceptions of teachers on the school gardens as a teaching resource and determined the challenges in using the school gardens as a teaching resource in secondary school. The study had revealed that teachers in central region of Malawi used the school gardens for teaching various subjects; however, agriculture and biology were the major subjects that teachers used the gardens for when teaching as compared to other subjects.

Teachers' attitude on use of school gardens for teaching had an influence in the way they used the school gardens. The findings had showed that teachers in central Malawi had positive attitude towards using gardens in teaching and this was explained by having 53% of teachers using them in teaching.

It was discovered that some challenges influenced teachers' use of the school gardens in teaching. Large classes, availability of time for practical lessons and inputs had an influence in the way teachers used the gardens for teaching.

5.2 Recommendations

From this study, the following are the recommendations:

- i. School administrators should ensure that school gardens are well resourced so that they can run throughout the year.
- ii. School administrators should organize special training for all the teachers on the use of school gardens as a teaching resource.
- iii. Teacher training institutions should treat school gardens as one of the teaching resources and impart that knowledge to their student teachers.
- iv. Teachers should encourage each other on the use of school gardens in teaching

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APPENDICES

Appendix 1: Questionnaire

My name is Masautso A. Mnyanga. I am a student at Sokoine University of Agriculture pursuing a Masters degree in Agricultural Education and Extension. I am conducting a research on “Factors Influencing Teachers Use of school Gardens in Teaching and Learning. May I ask you to take part in my research by answering a few questions that I have prepared.

This research is purely for academic purposes only.

You are free to take or not to take part in the research.

Your answers will only be used in coming up with an academic paper and nothing else.

Your name will not be disclosed to anyone as having taken part in the research

You can withdraw from the research anytime you feel like doing so.

Respondent's name: _____ Signature: _____

Date: _____

Date _____

Part One Demographic Information

Please **encircle** the option that best represents you

1. Type of school (1) CDSS (2) Boarding Secondary school
2. Sex. (1) Male. (2) Female.
3. Qualification (1) Primary teaching certificate (2) Diploma in Education (3) Degree in Education (4) Masters in Education (5) others (specify).
4. What form (s) do you teach?(1) form one. (2) form two. (3) form three. (4) Form four
5. Subjects that you teach: Major_____. Minor_____
6. How long have you taught at a secondary school level?

Part Two: How school gardens are used to teach specific subjects.

Please **encircle** the answer that best represents you and **fill** in the appropriate spaces.

7. Do you use the school gardens for teaching and learning? (1) Yes (2) No
8. If no, go to question 12
9. What subjects do you teach using the school gardens?
1_____ 2_____
10. What do you use the school garden for in teaching? (1) for carrying out practical work (2) as a reference material
11. In which specific topics do you use the school gardens for practical work?

12. In which specific topics do you use the school gardens as a reference material?

13. In your opinion, what other subjects can be taught using the school gardens?

14. How often do you use the school garden for teaching? (1) whenever I have a practical topic (2) whenever I have to refer to the school garden in my teaching. (3) Whenever I have a difficult topic which cannot be explained in class. (4) whenever I want to make my students active.
15. Why don't you use the school garden in teaching? _____

Note; Practical work is when students are involved in the school garden like in making nursery beds, ridges or planting while **Reference** is when the teacher or the students just talk about what is in the garden while they are all in class.

Part Three: Teachers perceptions on the school gardens as a teaching resource.

In the table below, tick the option that best represents your opinions on the use of school gardens as a teaching and learning resource.

KEY:

- 1- SD: Strongly disagree
- 2- D: Disagree
- 3- N: Neutral
- 4- A: Agree
- 5- SA: Strongly agree

Note: A neutral response implies that you neither agree nor disagree with the statement.

		1	2	3	4	5
		SD	D	N	A	SA
16	I can use School gardens in teaching any subject					
17	Teaching out in the school garden is exciting					
18	I like using the school garden for practical lessons					
19	I like using the school garden as a reference when I am teaching					
20	I feel that Pupils have more work that is practical in the school garden than in the classroom					
21	Pupils learn more in the school garden than in the classroom.					
22	Pupils learn to work in groups more in the school garden than in classroom.					
23	Pupils learn to be patient in the school garden					
24	Pupils are more creative in the school garden than in the classroom					
25	A school garden is dirty so I do not like to use it for teaching/learning					
26	Teacher training prepared me for the use of school garden in teaching/learning.					
27	Using a school garden for teaching is a form of punishment to students					
28	The dirty in the school garden stops me from using the school garden as a teaching resource.					
29	Teaching in the school garden is time consuming					

Please **encircle** one answer that best describes your response to the following statements.

30. I teach more in the school garden than in the class

1. Never taught in the garden
2. Not at all
3. Sometimes
4. Always

31. My fellow teachers support me in using gardens for teaching

1. Never lend support
2. Sometimes do not lend support
3. Not sure
4. Support only on request
5. Always lend their support

32. The school administrators are supportive to the teaching/learning using the garden

1. Highly supportive
2. Slightly supportive
3. Not sure
4. Unsupportive

5. Highly unsupportive

33. I enjoy more using the school garden for teaching than the classroom

1. Never
2. Neutral
3. Always

34. My friends influence how I use the school gardens for teaching and learning

1. Not at all influential
2. Not sure if they are influential on me
3. Very influential
4. Extremely influential

35. The subject in question can be a barrier to using a school garden in teaching and learning

1. Not a barrier
2. Somewhat a barrier
3. Moderate barrier
4. Extreme barrier

36. I am not familiar with the school garden as a teaching/learning tool

1. Not at all familiar
2. Slightly familiar
3. Moderately familiar
4. Extremely familiar

37. I am satisfied with the support that I get from the school administration

1. Very dissatisfied
2. Dissatisfied
3. Unsure
4. Satisfied
5. Very satisfied

38. I use the school garden for practical lessons when teaching

1. Never
2. Almost never
3. Occasional/sometimes
4. Almost every time
5. Every time

Part Four: Challenges in using the school gardens for teaching and learning.

Please **encircle** the option that best represents you and **fill** in the appropriate answers.

39. How many students do you have in your class? _____
40. What is the size of the school garden? (M²) _____
41. Does the number of students in your class affect how you use the school gardens?
(1) Yes (2) No
42. If yes explain your answer in () above

43. How many students are allocated to work per bed/row? _____
44. Do your students take their own time to work in the garden? (1) Yes (2) No
45. If yes what motivates them to work on their own?

46. Are inputs for the school garden readily available for teachers' use in teaching and learning? (1) Yes (2) No
47. Which inputs are mostly hard to get? _____
48. Are implements for School garden's use readily available? (1) Yes (2) No
49. Which implements are hard to get? _____
50. What is the source of water for the school garden? _____
51. Does the source provide water for garden use throughout the year? (1) Yes (2) No
52. If no, what do you do when the source cannot provide enough water for garden use? _____
53. How much time is allocated for practical work in the school garden?

54. Is this time enough for a teacher to effectively use the school garden for teaching?
(1) Yes (2) No.
55. If No, how do you make sure that you still use the School garden as teaching resource? _____
56. Who takes care of the school garden during school holidays? (1) community (2) casual labourers
57. Do you get any support from your fellow teachers in using the school garden for teaching? (1) Yes (2) No
58. If yes, what type of support do you get from them?

59. Does the school administration offer any support in your use of the school garden?
Yes/No
60. If yes, what type of support do you get from the school administration?

61. If no, why does not it support your use of the school garden as a teaching resource?

62. What roles are played by the school administration in the running of the school garden?

63. Have you ever attended any training on teaching using the school gardens? (1) Yes (2) No

64. If yes, what areas did it cover (1) establishing a school garden (2) managing a school garden (3) teaching and learning in the school garden (4) others (specify)

Note; Support is any assistance rendered to you as you use the school gardens in teaching and learning. It can be in the form of verbal encouragement, financial assistance and material assistance.

Note; School Administration is the managers of the school. They may be the Head-teacher, Deputy Head-teacher or the Head of Department.

Please feel free to write any comments on teachers' use of school gardens as a teaching/learning resource.

Thank you for taking time to answer these questions

Appendix 2: Key Informant Interview Checklist (Head-teacher, Deputy Head-teacher or Head of Department)

Why do you have a school garden?

For how long has this school garden been in operation?

How do teachers use the school garden?

What challenges do you face in running the school garden?

How do you know that teachers are using the school gardens for teaching and learning?

What is the school garden used for? (1) decorating the school (2) raising money for poor students (3) teaching and learning (4) producing food for students (5) others (specify)

THANK YOU FOR TAKING PART IN THIS DISCUSSION

Appendix 3: Focus group discussion questions (teachers) checklist

Do we use school gardens in teaching our students?

Why do we use the school gardens in the way we have given?

Which subjects are best taught using the school gardens and why?

How easy is it to teach using the school gardens?

If the school garden is the only teaching resource how best would you use it?

What other benefits apart from academic do students gain from the school gardens?

What challenges do we face in using the school gardens for teaching purposes?

THANK YOU FOR TAKING PART IN THIS DISCUSSION

Appendix 4: Key informant interviews with students (checklist)

Do you have a school garden at your school?

What do you use the school garden for?

In which subjects do your teachers use the school gardens for teaching?

Do you like to work in the school gardens?

How many times do you go to work in the school garden in a week?

What challenges do you face in using the school garden?

Do your teachers make efforts that you use the school gardens in your own time

What challenges do you face in using the school gardens?