RELATIONSHIP BETWEEN SELECTED TEACHER, INSTITUTIONAL AND CURRICULUM FACTORS AND TEACHING APPROACHES USED BY AGRICULTURE TEACHERS IN PUBLIC SECONDARY SCHOOLS IN NAKURU COUNTY, KENYA

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A Thesis Submitted to the Graduate School in Partial Fulfillment of the Requirements for the Doctor of Philosophy Degree in Agricultural Education of Egerton University

EGERTON UNIVERSITY

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DECLARATION AND RECOMMENDATIONS

Declaration

This is my original work and has not been presented for the award of diploma or conferment of a degree in this or any other university.

Signature:_____ Date:__23/11/2021

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Recommendations

This proposal has been submitted for examination with our approval as University supervisors

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DEDICATION

To all who stood with me as I pushed through to make it to the end.

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ABSTRACT

Delivering agriculture content using appropriate teaching approaches is one of the most crucial activities for teachers who have been singled out as a key factor in the implementation of any curriculum. Agriculture teachers in Kenya have largely been using teacher-centred teaching approaches which are not appropriate in imparting agricultural skills to the students. However, there is little information on correlation between selected teacher, institutional and curriculum factors and teaching approaches used by agriculture teachers, making it difficult to have interventions that would encourage teachers to use more appropriate teaching approaches. This study was intended to fill that gap by exploring the relationship between teacher, curriculum, and institutional factors and teaching approaches used by the agriculture teachers. A correlational research design was used to find out the interrelatedness of the selected factors and the teaching approaches used by agriculture teachers. The target population was all agriculture teachers in Nakuru County, and the accessible population was the agriculture teachers in public secondary schools. Stratified random sampling was used to sample 151 out of 242 agriculture teachers in public secondary schools in Nakuru County. The sample included 4, 11, 15 and 121 agriculture teachers from national, extra-county, county and sub-county public secondary schools respectively. Data were collected using the Agriculture Teachers Questionnaire (ATQ), Focus Group discussion Guide (FGG), and Classroom Observation Guide (COG). Experts in the field of education validated the instruments. The ATQ was pilot tested in Subukia sub-county, and the ATQ had a Cronbach's reliability coefficient of 0.7. *Chi*-square, Cramer's *V* coefficient, multinomial regression and descriptive statistics were used to analyse the data collected. The null hypotheses were tested at a significance level of $p \leq 0.05$. Data collected were analysed with the aid of SPSS. The study findings showed no significant relationship between teacher factors and teaching approaches and also between institutional factors and teaching approaches. However, a significant relationship was found between curriculum factors and teaching approaches. From the research findings, recommendation to the Ministry of Education is that, professional development activities should be provided continuously to refresh the teachers on the need to use appropriate teaching approaches in order to achieve the objectives of teaching agriculture. The mode of assessment of agriculture subject should be reconsidered such that there is more practical oriented assessment. The teaching workload need to be reviewed in light of class size and preparation time required for student-centered teaching approaches. To the curriculum developers, the researcher recommends that there is need to interrogate the secondary school agriculture curriculum vis-à-vis time allocated for the subject and the non-inclusion of double lessons in the teaching timetable.

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LIST OF ABBREVIATIONS AND ACRONYMS

AITSL	Australian Institute for Teaching and School Leadership
ATQ	Agriculture Teachers Questionnaire
CBE	Competence Based Education
CIDP	County Integrated Development Plan
COG	Classroom Observation Guide
DFID	Department for International Development
FDSE	Free Day Secondary Education
FPE	Free Primary Education
FGG	Focus Group Guide
GoK	Government of Kenya
ICSU	International Council for Scientific Unions
ISSC	International Social Science Council
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
KICD	Kenya Institute for Curriculum Development
KIE	Kenya Institute of Education
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNEC	Kenya National Examinations Council
NACOSTI	National Commission for Science, Technology, and Innovation
NEA	National Education Association
NTV	National Television
OECD	Organization for Economic Cooperation for Development
PDA	Professional Development Activities
SEM	Social Ecological Model
SPT	Social Practice Theory
TALIS	Teaching and Learning International Survey
TRA	Theory of Reasoned Action
TSC	Teachers Service Commission
UIS	UNESCO Institute for Statistics
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGA	United Nations General Assembly

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

Agriculture has the potential to grow faster and contribute more effectively to development in countries of Sub-Saharan Africa (Sertoglu et al., 2017). As one of the Sub-Saharan Countries, Kenya's agricultural potential includes the ability to alleviate poverty, increase food security, create employment and raise the income of the agrarian community (Faling & Biesbroek, 2019). One way of releasing this potential in agriculture is by offering quality agricultural education in schools. Ikehi et al. (2014) asserts that educational institutions are established to help deal with challenges in society. Thus, quality agricultural education could help in alleviating some of the challenges, which are agricultural in nature, facing Kenya today. One of the issues Kenya is struggling with is food security, which can be tackled from various dimensions including equipping the citizens with agricultural knowledge and skills. The National Food and Nutrition Security Policy (NFNSP) of 2011 has one of its objectives stated as 'to increase quality and quantity of food available, accessible and affordable to all Kenyans at all times' (Government of Kenya [GoK], 2011). Food security is one of the challenges whose solution can be contributed to through the agricultural education offered to learners in schools.

Research has shown that there is a positive correlation between secondary school agricultural education and farming productivity (Kipkemei et al., 2012; Yasmeen et.al., 2011). The implication of such research findings is that agricultural education in secondary schools need to be emphasised and supported. Well articulated teaching of agriculture in secondary schools is important since not all secondary school graduates end up joining tertiary institutions of learning. It is therefore prudent to ensure learners have enough skills for engagement in economic activities even if they do not continue with formal learning after secondary school level.

While the National Food and Nutrition Security Policy acknowledges that 80 percent of the rural population work on the farms and that the majority of farmworkers lack basic skills in agricultural production, little attention is given to strengthening agricultural education in secondary schools (GoK, 2011). Some of the suggestions given in the policy document is that of teaching about food nutrition in schools (not food production) and capacity building of those already working on the farms. The implication of these suggestions is that a lot of emphasis is not being given to the preparation of youth-in-school towards food production. Since research has shown that the knowledge and skills gained through participation in secondary school agricultural education is beneficial to individuals practising agriculture, it would therefore be prudent to equip

the youth enrolled in agriculture subject in secondary schools with agricultural knowledge, skills, and attitudes necessary to offer food security solutions to the society.

Due to this perceived importance of agriculture in meeting socio-economic needs, the Presidential Working Party on the Second University in Kenya referred to as Mackay's report of 1981 gave several recommendations, including the need to focus on technical and vocational training (Wamutoro, 2015). This led to the inception of the 8-4-4 education system in Kenya which saw the introduction of agriculture in all secondary schools offering the 8-4-4 curriculum in Kenya (Gikungu et al., 2014). According to the Kenya Institute for Education (KIE, 2002), the agriculture syllabus for secondary schools in Kenya was compiled with the intention of accomplishing two broad objectives. First, to help learners to understand basic principles of agricultural production and secondly, to involve the learners in practical work that will help them acquire agricultural skills. Therefore, the 8-4-4 education system aimed at having the learners acquire knowledge and practical skills that would make them self-reliant, participate in national economic development as well as prepare them for further training (Muchiri et al., 2013; Saina et al., 2012). An evaluation done in 2009 of the primary and secondary education in Kenya revealed that graduates of secondary school level did not have adequate skills and competencies to join the job market (Akala, 2021). According to Ngure (2013), graduates of any level of education with specific job skills are more likely to be productive since they will have been prepared for the tasks related to those skills.

Therefore, inadequate impartation of skills to learners may have led to curriculum reforms in Kenya where the country from the year 2017 has been in the process of changing to a Competency Based Education system. Amutabi (2019) reveals that the rationale for the curriculum reform is to address the mismatch between the current curriculum and the market needs. In the Competence-Based Education (CBE) system in Kenya, agriculture has been re-introduced in primary school, and the subject will be one of the core subjects up to junior secondary level (Republic of Kenya [RoK], 2017). This means that agriculture subject will be undertaken by all students in schools that offer the CBE from Grade 3 to Grade 9, and they may drop agriculture when they specialize and select pathways that do not require the subject. In Grade 10, learners who will, however, opt for the applied sciences pathway will have a chance to select whether to continue with agriculture as an applied science or as a technology.

Food security is one of the Big Four Agenda that the Government has identified as key priority areas to work on towards the economic growth of the country (The Republic of Kenya, 2018). Education is seen as a way of developing a skilled workforce that will accomplish the envisaged plans for the country within the Big Four Agenda, Kenya's Vision 2030, and strive to attain the Sustainable Development Goals (SDG). Kenya's vision for education sector for 2030 is

to have globally competitive quality education, training and research for sustainable development (Government of the Republic of Kenya, 2007). The offering of agriculture as a core subject in both upper primary and lower secondary shows the seriousness with which the Kenya Government is taking in ensuring that the country is food secure. How agriculture is taught in schools will, therefore, be key to ensuring that Kenya has citizens who have the basic agricultural skills that can be used to improve agricultural productivity towards food security.

Muma (2016) asserts that one of the challenges for creating employment in Kenya is inappropriate agricultural education at all levels. Since 40 percent of the KCSE candidates opt for agriculture subject among several vocational subjects offered in the secondary school curriculum (KNEC, 2019), it means then that if well taught in schools, agriculture can be used to prepare a skilled workforce that can improve the agricultural productivity. If secondary school leavers are adequately equipped with basic agricultural skills, unemployment levels can be alleviated which Atiti (2016) reports that it is most severe at 19-26 years of age among the youth in Kenya. This age group is comprised mainly of youth with secondary school education. Therefore, equipping secondary school agriculture students with basic agricultural skills may unleash the potential for agriculture towards national development.

In the article, 'Teaching threatens Sustainable Agriculture' Ison (n.d.) noted that to meet the 21st-century development needs, it will be necessary to do away with teaching that promotes memorizing and recalling information which leads to surface learning. Instead, teaching should focus more on giving students a more learner-centred learning environment whose outcome is likely to be deep learning. He further declares that the use of learner-centred teaching approaches, other than equipping the learners with the technical skills, ensures that the students' responsibility, leadership, innovation, creativity, and collaboration skills are enriched. Auwal (2013) asserts that 'what' students learn is greatly influenced by 'how' they are taught. There is need therefore to encourage teachers to use appropriate teaching approaches especially in agriculture. Further understanding of how teachers teach can remove barriers and enhance the enablers that will endear them towards the use of teaching approaches that will give the required outcomes.

Teaching approaches are based on teacher's beliefs, principles or ideas about the nature of teaching and learning which is usually interpreted in the manner in which the teacher actualizes teaching in the classroom (Aldajah et al., 2014). According to Hoque (2016), a teaching approach is a teacher's personal philosophy of teaching and as Rhalmi (2018) states, it is a general assumption about how teaching and learning should occur. Thus, some authors like Tahir (2012) views teaching approaches as a theoretical assumption of how teaching and learning takes place and it forms the beginning point in the teaching process. It is therefore from the teaching

approaches held by the teachers that directs them to select teaching methods that are in line with the teaching approaches. According to Rahimi and Asadollahi (2012) teaching approaches are persistent ways of approaching the learners that might be consistent with several methods of teaching. Tahir (2012) illustrates that teaching methods ultimately becomes the plan that is used to indicate how the teaching approach will be executed in class. Teachers therefore plan for instructional activities they believe will help the learners learn the content effectively. This study considered five categories of teaching approaches as endorsed by Grasha (2002) which are; Expert, Formal Authority, Demonstrator, Facilitator, and Delegator teaching approaches.

The developers of CBE in Kenya envisaged the necessity of having both the technical and life skills for the learners to operate successfully in the world and consequently they have been entrenched in the curriculum (RoK, 2017). This assertion of developing both the technical and life skills is confirmed by Cheptoo and Ramdas (2020) which implies that teachers may be required to focus on the teaching approaches that will impart the skills envisioned in the curriculum. Therefore, as Kenya embraces the Curriculum Based Education (CBE) there is need to ensure that the students are taught using teaching approaches that will enhance the development of the skills prescribed in the curriculum. The teaching approaches encouraged by CBE is where the learner is in the center of the teaching process, that is, fully participating in the teaching and learning process (RoK, 2017).

Learner-centred teaching approaches are crucial in helping Kenya make headways in accomplishing the objectives of teaching agriculture and by extension the sustainable development goals (SDG) number two and four. The SDG number two seeks to 'end hunger, achieve food security and improve nutrition, and promote sustainable agriculture' (Osborn et al., 2015). SDG number four targets the quality of education offered whereby one target that was proposed to help achieve this is by ensuring access to quality vocational education and 'to increase the number of youths who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship' (United Nations General Assembly [UNGA], 2015). Appropriate teaching approaches will thus ensure that the youth have skills in agriculture for effective citizenship and contribution to food security for national sustainability (Evelia et al., 2014). Agriculture teachers should be encouraged to take up teaching approaches that will enable the learners to acquire agricultural knowledge, skills and proper attitude towards agriculture practice.

Research on the quality of secondary school graduates indicates that teaching of agriculture focuses more on knowledge than skill acquisition (Ison, n.d. & Muma, 2016). This implies that more of principles of agriculture is taught and very little of agricultural practices giving the graduates knowledge which they are not able to apply appropriately. To solve the problems in the

society, a practical approach is fundamental. The approaches to teaching agriculture, therefore, requires learners' involvement in practical work that is related to agricultural production in line with the syllabus provided. Njura et al. (2020) acknowledge that the delivery of agriculture content at the secondary school level should be handled as a vocational subject that helps the learners to acquire practical agricultural skills for meaningful living.

Agriculture KCSE mean grades for the last nine years (2010-2018) portray poor performance by agriculture students in the national examination. In the reports by Kenya National Examinations Council (KNEC) (2016, & 2019), the percent mean score for agriculture was 34.95 per cent for the years 2010-2018 (Appendix D). This performance gives agriculture the lowest scores achieved by learners among the technical subjects offered in secondary schools, and yet from KNEC (2016 & 2019) the subject has the highest number of the students' enrolment (40 per cent). Other technical subjects' mean scores are above 50 per cent (Appendix E), making agriculture the only technical subject whose mean score is below 50 per cent. This poor performance implies that a significant number of secondary school graduates (40 per cent), who take agriculture subject, are not adequately equipped with technical skills and knowledge.

Mwiria (2005) asserts that vocational subjects are meant to inculcate practical skills that are useful in one's private life as well as being useful in large occupational opportunities for the school leavers. The poor performance in agriculture is of concern because secondary school students have a chance of not taking the subject at the beginning of their first year in secondary school and another chance to drop the subject at the end of the second year. It is therefore expected that the students who choose the subject have a positive attitude towards the subject and hence would be motivated to perform well (Kabugi, 2013; Muchiri et al., 2013). This poor performance in the subject should be of significant concern to educational planners, administrators, students, teachers, parents, and other stakeholders. Thus, there is a need to look into how agriculture students' achievement can improve as a way of confirming that they have acquired the necessary level of knowledge and skills to solve agricultural problems in the society as acknowledged by Saina et al. (2012).

Research on the effectiveness of teaching approaches indicates that the quality of teaching is often reflected by the achievements of the learners (Kimani et al., 2013; Zuzosky, n.d.). Thus, use of appropriate teaching approaches not only improves students' academic performance but also may be one of the factors that can help increase the participation of secondary school education in the success of SDGs and Kenya's Vision 2030 (Vaz (2012). In addition, the use of appropriate teaching approaches is crucial as Kenya rolls out CBE which has a strong bias towards technical subjects. According to (Olwande 2021), technical subjects are meant to strengthen

Technical and Vocational Education and Training (TVET) offered as post-secondary education training. Similarly, a report from the education policymakers in Kenya states that, one strategy of strengthening TVET is by encouraging secondary schools to enhance the technical education offered to students (Ministry of Education and Ministry of Higher Education, Science Technology, 2012). Kafwa et al. (2015), supports the strategy of strengthening TVET by stating that teaching effectively allows the country to align the education system with the development needs of the 21st century.

Luntungan (2012) asserts that as much as effective learning depends on various factors; some of which are teacher-related, the teaching approaches used by teachers continue to play a significant role in student learning and their academic performance. The fact that teaching approaches have a significant effect on students' scores has been supported by other studies (Sadi & Cakiroglu, 2011; Weldy &Turnipseed, 2010). The teaching approaches applied by teachers not only determines the extent of learner participation in the teaching and learning process but also how much learning takes place during the teacher-learner interaction.

Research in pedagogy has suggested teaching approaches that can provide the best learning for students. The effects of teaching approaches on students' learning have been explored extensively in many subjects including agriculture. Ouma et al. (2020) suggest that experiential learning would be more useful in helping learners acquire practical skills in agriculture. In addition, Waiganjo et al. (2014) found cooperative learning approach to yield better results than the conventional teaching approaches. Such studies have provided evidence of how different classroom instructional practices impact on academic achievement of secondary school students in agriculture. However, a study done by Evelia et al. (2014) in Masaba North Sub-County of Nyamira County in Kenya revealed that agriculture teachers often use teaching approaches where the teacher is the focus of the teaching and learning process. According to the study, the teacher does most of the talking or reading out notes, sometimes directly from the text book as students write notes during agriculture lesson. The same study found out that agriculture teachers rarely use the school farm or field trips for teaching purposes.

The teacher-centred teaching approaches may not fully help achieve the objectives of teaching agriculture subject. This confirms the recommendation given by KNEC (2014) to agriculture teachers that they should make use of field trips to expose agriculture students to agricultural activities. It is necessary therefore to find out what factors correlate with teaching approaches used by agriculture teachers in Nakuru County. The achievement of SDG number four on education, as cited by International Council for Scientific Unions (ICSU)-International Social Science Council (ISSC) (2015), as well as the implementation of the CBE, are likely to be a success

if interventions are applied to deal with the limitations that hinder the use of appropriate teaching approaches by secondary school agriculture teachers. This would be key to making the learners acquire the necessary principles and practices in agriculture as outlined in the curriculum.

Grasha (1992) came up with five teaching approaches after studying teachers for many years. These teaching approaches are expert, formal authority, demonstrator, facilitator, and delegator. The approaches are on a continuum with the expert approach being the extreme of teacher-centred approach and on the other hand, delegator approach being the most learner- centred approach. In this study, an investigation into the preferred teaching approaches used by agriculture teachers was done.

Various factors may correlate with the teaching approaches used by agriculture teachers among them being student factors, the category of school, the community around the school, teacher factors, curriculum factors, and institutional factors. This study considered three factors namely; teacher factors, curriculum factors and institutional factors. These factors are selected based on the fact that they are central to the implementation of any curriculum as they indicate, what is to be implemented and how agriculture is evaluated (curriculum), who is to implement (teacher), and where the implementation will take place (institution).

Teacher factors are characteristics of the teacher that may contribute towards the choice of teaching approach used. Bolaji et al. (2016) indicates that teaching experience is positively correlated to teacher's effectiveness. Teachers' qualification may play a part in the choice of teaching approach if the teacher training programme differs at different levels, that is, at diploma, bachelor degree, or master's degree level and above. Kimani et al. (2013) found that teacher's age was not significantly related to students' academic performance while Adiembo and Simatwa (2014) suggest that there is a need to investigate this relationship further. However, some have shown that teacher's gender can make a difference in students' outcomes (Gong et al., 2016; Nnamani & Oyibe, 2016). There are conflicting results from various studies as to whether a teacher's gender is important in influencing student learning. This study found out that there is no correlation between gender and choice of teaching approach.

Curriculum factors are the policies, recommendations, and expectations of the curriculum developers that the teacher considers in implementing the curriculum. Educational policies are decision(s) made by policymakers to respond to a need in the society and given to the educators to implement through the system of education (Haddad & Demsky as in Madani, 2019). According to OECD (2015), educational policies are as a result of the recognized need for knowledge, skills and innovations required for the growth and development of a country. In this study, the curriculum factors considered were aspects of the agriculture syllabus, mode of assessment of agriculture at

KCSE level, professional development activities and teaching workload. Thobega et al. (2011) believe that these factors influence the way agriculture is taught. This study sought to get agriculture teachers' perspectives in order to establish whether there is a relationship curriculum factors and teaching approach used.

Institutional factors are characteristics of the school that makes up the environment in which the teacher works. Adeyemi and Adeyemi (2014) affirm that the school should provide an enabling environment for the teaching/learning process to take place adequately. Class size has been found to influence learning outcomes (Schanzenbach, 2014). This is because the institution's infrastructure is also essential to the agriculture teacher in defining what is available to the teacher and learners for learning purposes. According to Mlama et al. (2005), the number of students should match the available facilities and resources for learning to be meaningful. The availability of a school farm, agriculture workshop, and an equipped school library are crucial to a teacher in designing a lesson for the learners. Therefore, the school administration's support in creating an enabling environment is vital as this may influence the teaching resources availed to agriculture teachers.

This study investigated how selected factors are likely to correlate with teaching approaches used by agriculture teachers in public secondary schools in Nakuru County. According to the County's Integrated Development Plan (CIDP) of 2018-2022 (Nakuru County, 2018), Nakuru is one of the agriculturally rich counties whose background was shaped by the early white settlement schemes. The CIDP states that the arable land in Nakuru county makes up 72.68 per cent of the total land area (Nakuru County, 2018). The expansive arable land available requires the county leadership to lay strategies on how the agricultural potential can be developed for the betterment of the livelihood of its' population. Nakuru is among the counties in Kenya with the highest number of public secondary schools as well as KCSE candidature (KNEC, 2015). The County's mean score for agriculture for the years 2012 to 2017 was 44.1 per cent (Nakuru County Education Office records, Sept 2017) which is an equivalent of D in the KCSE grading system. Public secondary schools were used in this study since they form 70 per cent of the total schools (427 schools) in Nakuru County and admits the majority of the secondary school students. Private secondary schools were excluded since some do not offer 8-4-4 curriculum which means they may not offer the subject or the agriculture content offered could be different.

1.2 Statement of the Problem

The teacher as a key player in the implementation process of any curriculum needs to organize the teacher and learner activities prudently for the prescribed learning outcomes to be

achieved. This does not seem to be the case in the teaching of agriculture in public secondary schools in Kenya. Student performance, which is an indicator of teaching effectiveness, has been below average in Agriculture in the KCSE and the lowest compared to other technical subjects for the years 2010 to 2018. This is an indication that the learning outcomes are not adequately achieved. Reports by KNEC indicate that 40 per cent of KCSE candidates are examined in agriculture every year. This gives agriculture subject the highest number of students enrolled in any of the vocational subjects offered at secondary school level. This means that a substantial number of youths in Kenya exit secondary school without being adequately equipped with basic technical skills which is what the 8-4-4 and the new competence-based education systems envisage. This could be due to several reasons including the teaching approaches used to teach the learners. Relationship between teacher, curriculum and institutional factors and teaching approaches used by agriculture teachers is not adequately documented and especially for Nakuru County. If this relationship is not well understood, it may not be easy to have interventions that will enable the agriculture teachers to make use of appropriate teaching approaches; secondary school agriculture graduates may continue lacking basic skills for gainful employment in the agricultural sector, and successful implementation of the agriculture curriculum in the competence-based education system in Kenya maybe jeopardized. Some of the factors that may correlate with teaching approaches used are teacher factors, curriculum factors, and institutional factors. It is not clear whether these factors correlate with teaching approaches used by agriculture teachers and if they do, the strength and direction of their relationship. This study sought to explore the relationship between selected factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County.

1.3 Purpose of the Study

The purpose of the study was to investigate the relationship between selected teacher, curriculum and institutional factors and teaching approaches among agriculture teachers in public secondary schools in Nakuru County, Kenya.

1.4 Objectives of the Study

The following objectives guided the study:

i. To investigate the relationship between selected teacher factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya.
ii. To investigate the relationship between selected curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya.

iii. To investigate relationship between selected institutional factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya.

1.5 Hypotheses of the Study

The following null hypotheses were formulated and tested at a significance level of $p \leq 0.05$:

$H0_1$: There is no statistically significant relationship between selected teacher factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya.

$H0_2$: There is no statistically significant relationship between selected curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya.

$H0_3$: There is no statistically significant relationship between selected institutional factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya.

1.6 Significance of the Study

The study is significant since it targets improvement of agriculture curriculum implementation through teaching effectiveness by giving an insight into the relationship between selected teacher, institutional and curriculum factors and teaching approaches used by agriculture teachers. The findings of the study may be useful to curriculum developers and policymakers in understanding the current teaching practices of agriculture teachers as far as teaching approaches are concerned. This may help identify reasons why agriculture teachers teach the way they do with a view to examining what could be targeted for change. The findings highlight the importance of schools creating an enabling work environment for the agriculture teachers in support of the teaching of agriculture. The school administrators may find the study useful in giving information on ways in which they may support the agriculture teachers to execute their teaching roles amicably. The teacher trainers may use the information generated to improve the training offered to the agriculture teachers to lay emphasis on the teaching approaches appropriate for imparting skills to agriculture students. The knowledge may help agriculture teachers understand what factors could be related to the way they teach and thus find ways of overcoming barriers that hinder them from using the appropriate teaching approaches. The insight may help teachers to be innovative and hence improve teaching effectiveness. Agriculture students are likely to benefit by acquiring agricultural skills when taught by teachers using appropriate teaching approaches. In

addition, other researchers can use the information generated as a framework or a basis for further research.

1.7 Scope of the Study

This study was done in Nakuru County and it involved agriculture teachers in all categories of public secondary schools. The school categories are national, extra-county, county and sub-county secondary schools. The study looked into five categories of teaching approaches namely; the expert, formal authority, demonstrator, facilitator and delegator teaching approach. Collection of data was done in three months, that is, January to March 2019 period. The data were then analysed to provide the findings presented in this report.

This study considered the relationship between selected factors and the teaching approach that the agriculture teachers use. The selected factors are the teacher, curriculum and institutional factors. These three factors are central to curriculum implementation since they indicate what is to be implemented (curriculum), who is to implement (teacher) and where implementation of the curriculum is to take place (school or institution).

The teacher factors that were considered in this study are teacher's gender, age, experience and academic qualifications. The curriculum factors considered were the agriculture syllabus, mode of assessing agriculture, agriculture teacher's teaching load and the professional development activities availed to agriculture teachers. The institutional factors studied in this study were the school farm, school administration support, school library and class size.

1.8 Assumptions of the Study

The study was based on the assumptions that;

i. The learners' attitude does not impact on teachers' choice of the teaching approaches to use since the learners are assumed to like agriculture subject after selecting the subject among other technical subjects.
ii. School location does not affect the teaching approaches used since all schools use the same agriculture syllabus.
iii. Training background of the agriculture teachers is assumed to be similar, and therefore every qualified and registered agriculture teacher has adequate knowledge of various teaching approaches.

1.9 Limitation of the Study

Agriculture teachers responded to the items in the questionnaire by recalling what transpires in class. The implication of this is that they may not have been very accurate. This deficiency was overcome by having different items in the instrument that require a similar response and by corroborating the teachers' responses with classroom observation and data collected from agriculture teachers' focus groups discussions.

1.10 Definition of Terms

The following are the key terms used in this study:

Academic Qualification: According to Lame and Yusoff (2015), academic qualification means the degrees, diplomas, certificates, professional titles an individual has obtained. In this study, the term refers to the highest academic qualification for the agriculture teachers.

Agriculture Teacher: This is a person who provides planned agriculture subject content and learning experiences to develop knowledge, skills, and attitudes in the learners (Shinn, 1997). In this study, this term was used to refer to a teacher who has been assigned the role of teaching agriculture to the students.

Blended Teaching Approach: Phavadee (2020) gives the meaning of blended teaching approach as an integrated way of teaching that merges the teacher's personality and interests with the learners needs. In this study, blended teaching approach refers to when a teacher uses a mix of different teaching approaches.

Class size: Great Schools Partnership (2015) gives two meanings of class size in their education reform glossary. Class size can mean the actual number of students who regularly appear for a teacher's class or lesson. It could also mean the average number of students taught by teachers in a school or education system. This study considered class size to be the actual number of students agriculture teachers handle in their class.

Curriculum Factors: Su (2012) states that in a narrow sense, curriculum is taken to mean the content that teachers to learners in school. However, Pratt (1980 as cited in Su, 2012) says that curriculum is broader than the initial meaning given, whereby, the author says it is a detailed plan of all that is involved in the delivery of the content. This includes the written document, materials, facilities, personnel, time and cost. In this study, curriculum factors are the written document (syllabus), the evaluation mode at KCSE, teaching workload for agriculture teachers and professional development activities (PDA) for agriculture teachers.

Delegator approach: The teacher uses projects to teach and aims at developing students' capacity to function autonomously with the teacher being available as a resource person (Grasha, 1994 & 2002). This study took delegator approach to mean a teaching approach where the teacher gives learners freedom to choose how to learn and thus the use of projects is preferred.

Demonstrator approach: This is also referred to as Personal model approach where the teacher believes in teaching by personal example as the best approach to teaching. Emphasis is laid on direct observation by the learners as the teacher demonstrates (Grasha, 2002). This study used this term to mean teachers who prefer demonstrating, especially the agriculture skills, to learners and expects the learners to emulate them.

Expert approach: This approach to teaching assumes teachers to be the custodian of knowledge and their role is to dispense the knowledge to the students. The learners are passive, and the teacher does not give feedback to the learners. This study this term to mean teachers who mainly use the lecture method where the learners are passive, with minimal teacher-learner interaction in class.

Facilitator approach: The overall of this approach is to develop in students the capacity for independent action and responsibility. The teacher asks questions to guide learning, provides support thus acting as a consultant (Grasha, 2002). This study used the term to refer to teachers who facilitate learning and guiding the students and being present for consultation.

Formal authority approach: The teacher's focus is to follow the correct, acceptable and standard ways of doing things; hence, the teacher is perceived as strict (Grasha, 2002). This study used this term to me teachers who are strict and expects the students to follow strictly the laid down rules and procedures.

Institutional Factors: These are the characteristics of the school that forms the teaching and learning environment. It includes the physical infrastructure used by teachers and students in their daily activities in school, school leadership and school policy (Onyara, 2013). In this study, the term took the meaning of physical resources namely, school farm, school library needed for teaching agriculture as well as class size and support given by the school administration to the agriculture teacher.

Mode of Schooling: This term in this study refers to whether the students reside in school throughout when school is in session or whether the students commute from home every day. Thus, in Kenya, there are three sorts of schools based on the mode of schooling, namely, Boarding, Day and Day/Boarding. In Boarding schools, all students reside within

the school; in day schools all students commute from home whereas in Day/Boarding schools, a portion of students reside within the school and some commute.

Professional Development Activities: This is the development of teachers beyond their initial teacher training programme and includes activities that are meant to develop teacher's to be more effective in teaching (OECD, 2009). There are various types of PDA for teachers both formal and non-formal. This study considered conferences, seminars and workshops planned for agriculture teachers to constitute PDA.

School Category: The term School category has been defined differently by different people. For some it is defined by the gender of the students attending the school and for others by the catchment area, Kenya Certificate of Primary Education (KCPE) marks attained or even the infrastructure available within the school. Asiago, et al. (2018) gives the categorisation of secondary schools in Kenya as national, extra-county, county and sub-county schools. From an education officer S. N. Mwaniki (personal communication, March 1st, 2018) public secondary schools in Kenya are categorized based on the school's infrastructure, the catchment area from where the schools select their students and also based on the KCPE marks obtained by the learner. In this study, the categorization of the schools was in four categories; national, extra-county, county and sub-county schools.

School type: In this study, the term was used to refer to students' gender admitted to a school, thus there are Girls' schools for girls only, Boys' schools for boys only and Mixed schools that admit both boys and girls.

Teaching Approach: According to Rahimi and Asadollahi (2012) teaching approach is a persistent way of approaching the learners that might be consistent with several methods of teaching. A teaching approach is based on beliefs, principles or ideas about the nature of learning which is translated in the classroom. Teaching approach in this study refers to a pattern of how a teacher teaches based on the teaching and learning activities executed during the lesson. These are activities that the teacher believes help the learners learn the content effectively. The study considered five categories of teaching approaches as endorsed by Grasha (2002) which are; Expert, Formal Authority, Demonstrator, Facilitator, and Delegator teaching approach.

Teaching Experience: This is defined differently by different people like Rodriguez and Mckay (2010) notes. Some take it to mean the number of years a teacher has taught, to others it is the ability to motivate students and hold their attention or even knowing how to manage a class. In this study, teaching experience was taken to mean the number of years a teacher has taught agriculture subject.

Teacher Factors: These are attributes of a teacher that may contribute to teacher effectiveness as reported by Waseka et al. (2016). This study takes the same meaning and considered the following teacher factors; age, gender, academic qualification and teaching experience.

Teaching Workload: Some take teaching workload to be time spent in planning the lesson and teaching, administrative roles and co-curricular responsibilities (Hosain, 2016). This study considered teaching workload to be the total number of lessons the agriculture teacher has been assigned to teacher per week as indicated in the school main timetable.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter analyses the literature pertinent to this study. It starts by stating the importance of agriculture. A description of effective agriculture teacher as well as teaching approaches that can be applied in teaching agriculture in secondary schools are given. The teaching approaches deliberated on are expert, formal authority, demonstrator, facilitator and delegator approach. Factors that are likely to relate with teaching approaches applied in teaching agriculture to secondary school students in Kenya are also discussed. These factors are teacher factors, curriculum factors, and institutional factors. Finally, the conceptual framework for this study is discussed together with its theoretical basis.

2.2 Importance of Agriculture

The agriculture sector dominates the world's economy, and Mellor (2017) states that agricultural growth can alleviate poverty and increase food security. According to Praburaj (2018), most of the countries whose economy growth is high started by developing the agricultural sector before industrial growth could be realized. This author states that in some developed countries like England, agricultural development came before industrialization. In Japan and United States of America, agricultural development was a strong driving force for industrial growth and development. Department for International Development [DFID] 2014 sees agricultural and industrial sectors being complementary supporting each other. Sarwar (2014) supports the fact there is a close linkage between agriculture and other sectors like trade and manufacturing through the provision of unprocessed produce from the farms. The reason for this is that, increase in agricultural productivity increases demand for the non-farm sectors. Thus, growth in the agricultural productivity not only creates employment in this sector but also across sectors.

Farauta and Amuche (2013) posit that in most African countries, agriculture contributes significantly to the Gross Domestic Product (GDP). According to a report by OECD/FAO (2016) that gives an agricultural outlook in Sub-Saharan Africa (SSA), agriculture contributes 3-60 percent to GDP in the SSA countries. In addition, Mukasa et al. (2017) state that the agricultural sector employs 65-70 percent of Africa's workforce. According to Diao et al. (2010), the agricultural potential in Africa remains untapped and therefore agricultural development is seen as an opportunity to alleviate hunger and transform the economies of African countries. Agriculture, therefore, is key in alleviating hunger and poverty and also reducing unemployment rates as entrenched in the sustainable development goals (UNGA, 2015). It seems that if more attention

can be given to the agriculture sector by governments of the African nations, there is likely to be economic benefits beyond increased food supply. One other economic benefit would be employment opportunities across the sectors. It therefore for a skilled labour force ready to take up roles in the agricultural sector for increased economic growth to be realized.

In Kenya, agriculture is important in economic development as it contributes to 33 per cent of GDP and constitutes 65 per cent of the export earnings (Kenya Institute for Public Policy Research & Analysis [KIPPRA], 2017). In addition, more than 40 per cent of the total population is employed in the agriculture sector. Agriculture provides a livelihood to more than 80 per cent of Kenyan population implying that it is the means of well-being for the majority of the Kenyan population (GoK, 2012). Food insecurity continues to persist in Kenya which indicates that if effort is made from various perspectives to increase agricultural production, levels of hunger in Kenya can be alleviated. Diao et al. (2010) states that agriculture growth is able to deal with issues of food insecurity since agriculture produces goods that satisfy basic human needs directly. The report on Kenya's economic performance indicates that economic growth is highly correlated with agricultural development. This correlation means that a positive growth in the agricultural sector leads to a positive national economic growth. This implies that if more people engage in agricultural economic activities, this will grow the country's economy thus contributing to the economic pillar of Kenya's Vision 2030.

Increased agricultural productivity can help improve the food and nutrition status in Kenya, betterment of living standards, increased income generation and wealth creation. According to Ministry of Agriculture, Livestock and Fisheries [MoALF] 2017, the agriculture sector is not making use of the youth potential in contributing to the sector's goals, which include, to improve food and nutrition security, create decent employment and income generation. If more youth were to engage in meaningful income generating activities, their involvement in deviant behaviour would decrease (Atiti, 2016).

2.3 Teaching Approaches in Agriculture

A teaching approach is a complex educational behaviour of a teacher in using methods, techniques, tools, and communications to achieve goals and objectives (Gill & Kusum, 2017). According to Abbas and Hussain (2018), the teaching approach is concerned with how content is conveyed and hence it shows general characteristics and qualities that a teacher shows in the classroom. Aldajah et al. (2014) posit that teachers develop a way of teaching based on their beliefs about teaching, their abilities and the norms of their particular discipline. A report by the Irish National Teachers Organization [INTO] (2007) posits that how much a learner retains of what the

teacher communicates in class depends on the teaching approach used. The report stipulates the percentage of learning retained when different teaching approaches are used as follows; five per cent for lecturing approach, 15 per cent when visual arts are used, 30 per cent for demonstrations, 50 per cent for small group work, 75 per cent for experimental work and 90 per cent for peer tutoring. It is clear that the more learner-centred teaching approaches are the most effective they are in causing learners to learn.

One of the factors that contribute to students' performance is the teaching approach used by the teacher. Ganyaupfu (2013) suggest that there is a close relationship between teacher's interaction with the students in class and students' academic achievement. Wenglinsky as in Heck (2009) further argues that students can leave the classroom with their knowledge and attitudes noticeably changed from what they were before they entered. Stes et al. (2014) states that teaching approaches are about teachers' conception of teaching which in turn informs their actual teaching behaviour. Hence what influences this teacher-student interaction as a dimension of the teaching and learning process is worth studying.

Agriculture curriculum in secondary schools was designed to be taught in a manner to equip the students with various agricultural skills and prepare them for further career development (Croom, 2008). In America, for example, as early as the beginning of the 20th century, the National Education Association (NEA) recommended that secondary school agriculture should give sufficient technical training for the students to make them self-reliant and useful in the society. The training was also meant to prepare the students to progress in agriculture-related courses (Chingos, 2011).

In USA, Hughes and Barrick (1993) developed a model for teaching agriculture that has three interconnected components. The first component is the classroom or laboratory instruction used to promote leadership skills, personal development, and technical skills. Secondly, the experiential learning that would take place outside the classroom was meant to be the application component that would allow the learners to apply a portion of what they learn in class as well as developing work-related instructions. Lastly, leadership education would be delivered through student organizations as a way of enhancing personal development (Alexander et al., 2017). The model made teaching approaches to agriculture to be practical and experiential oriented. Mukembo and Edwards (2016) assert that the experiential learning can be on the school farm whereby the teacher assigns projects to the learners or where possible learning can take place in the community. The model works well in the developed countries, particularly because of the support teachers get regarding the availability of teaching and learning resources and regular or continuous professional

development activities that help the teacher to keep abreast with agricultural innovations and pedagogical issues.

In Africa, the model for teaching agriculture in secondary schools is similar to that of the developed countries whereby agriculture is intended to be taught as a vocational subject (Olajide et al., 2015). The model indicates that the principle of learning by doing should be highly considered in the teaching of agriculture. Auwal (2013) asserts that learner engagement in the learning process is essential whereby the students benefit from knowing how to execute a strategy, knowing why the strategy works and knowing where the strategy works. This implies that the teaching approaches used in teaching agriculture subject in secondary schools ought to expose the learners to a lot of hands-on experiences. Such experiences will make the learners acquire the competencies outlined in the agriculture curriculum for secondary schools.

Kidane and Worth (2012) says that the agriculture curriculum in most African countries has enough content to give the learners adequate theory and practice in agriculture. However, challenges hindering the effective implementation of agriculture syllabus exist (Kyule et al., 2016). Some of these challenges include lack of textbooks, lack of qualified teachers, inadequate funding, inadequate teaching aids or materials (Kidane & Worth, 2014). Also, Vandenbosch as quoted in Kabugi (2013) acknowledges that in Sub-Saharan Africa, the teaching of agriculture is overloaded with classroom lessons at the expense of practical applications. A report by INTO (2007) outlines some challenges that teachers have expressed in explaining their failure to higher-order thinking skills to include; time management, curriculum overload and large class sizes.

The same model was used by Maxwell in Kenya as he established the teaching of agriculture in secondary schools in 1960 through what is called the Chavakali experiment. He had three objectives for teaching agriculture in line with the three components of the model for teaching agriculture (Kipkemei et al., 2017). Maxwell's aim was to make the secondary school graduates suitable for effective employment in agriculture. This model can be applied in Kenyan schools if agriculture teachers can make use of appropriate teaching approaches that offer the learners more experiential learning in readiness for life after school.

Njura et al. (2020) maintain that agriculture should be taught in such a way that the learners acquire practical skills that will enable them to be useful to self and society. However, they noted that teaching approaches used by agriculture teachers in Nigeria are full of 'showing', 'telling' and 'observing' and less of 'learning by doing' and 'guided discovery'. The situation is very similar to how the teaching of agriculture is done in Kenya as confirmed by a study by Evelia et al. (2014) which indicates that agriculture teachers in Kenya use teaching approaches that are less effective in imparting skills to the learners. In the examination reports by KNEC (2016 & 2019), one of the

general advices given to agriculture teachers is that they should use a variety of teaching approaches. The reports continue to advice that use of resource persons, field trips and teaching approaches that would give the learners hands-on experience are highly recommended. The use of less effective teaching approaches may have led to the graduates of secondary schools often not being able to participate in agricultural economic activities once they complete their secondary school education.

Agriculture was introduced as a subject in all secondary schools in Kenya at the inception of the 8-4-4 system of education in the year 1986. The aim was to prepare the students to enter the world of work through employment or self-employment. The teaching of agriculture subject in secondary schools was therefore meant to instil basic agricultural skills and knowledge in the learners to enable them to contribute meaningfully to the society. When the agriculture curriculum is implemented effectively, the secondary school graduates ought to have basic agricultural skills and a positive attitude to enable them to be self-employed or seek employment in the agricultural sector. Having the basic agricultural skills through agricultural education offered in schools can contribute to alleviating the unemployment situation in Kenya which is reported to be highest among the youth. According to Ministry of Agriculture, Livestock and Fisheries [MoALF] 2017, 80 percent of the unemployed in Kenya are the youth and that the average age of farmers in Kenya is around 60 years. This report by MoALF also states that fewer youths are engaging in agriculture based economic activities than would be expected given their proportion in the population. For instance, the youths may start simple projects like raising vegetable or fruit tree seedlings for sale, work on farms where the skills they have acquired can be utilized.

Agriculture teachers in Kenya face similar challenges experienced in other African countries. These challenges include inadequate resources such as school farm, agricultural tools, agriculture classrooms and workshops, high teachers' workload (Kabugi, 2013; Konyango et al., 2015) and lack of adequate administrative and technical support (Muchiri & Kiriungi, 2015). This study may be useful in giving an insight not only to the poor academic performance of learners in agriculture subject but also how these challenges have impacted the choice of teaching approaches used by agriculture teachers.

Choice of appropriate teaching approaches is paramount a time like now when Kenya is in the process of changing the school curriculum from 8-4-4 to 2-6-6-3 education system. The new education system which will emphasize teaching competencies or skills to the learners entered the piloting stage as from May 2017 (Koskei & Chepchumba, 2020). The 2-6-6-3 education system has a bias towards technical and vocational education and training. Therefore, if this education system is to succeed in achieving its objectives, then, it will be imperative to consider how to deal

with the barriers that may hinder agriculture teachers from using teaching approaches that will equip the learners with the required skills and knowledge. The importance of using the appropriate teaching approach in teaching agriculture should be underscored more now that the subject has been re-introduced in primary school in the new education system.

The Basic Education Curriculum Framework (RoK, 2017) for the new education system in Kenya intends to introduce agriculture as a stand-alone subject in Grade 4 and all learners will study it up to Grade 9. After Grade 9, the subject will be optional and only those learners intending to advance their careers in agriculture-related areas will take the pathway offering agriculture. The implication of this is that the agriculture teachers should meticulously implement agriculture curriculum in such a way that the learners can gain competencies that can help improve agricultural productivity and also motivate more learners to opt for agriculture-related career pathway. This calls for a deliberate choice of appropriate teaching approaches by the agriculture teachers that will make learning to be learner-centred and which provide a lot of hands-on experiences to the learners.

Teachers are important influencers of the quality of learning that takes place since they are responsible for translating the curriculum as they interact with the students in the class (Ahmed et al., 2012; Hayes, 2014; Kimani et al., 2013). Thus, teachers should make an effort to bring about desirable changes in learners to achieve specific outcomes. According to Wong (n.d.), an educator, author and teacher trainer, it is what a teacher does in class that determines student learning. The quality of teacher-learner interaction during the learning process becomes very important in determining how much a learner understands the content. Educators and researchers have proposed different approaches to teaching as being suitable for improving the performance of students in various subjects (Nafees et al., 2012; Waiganjo et al., 2014; Wambugu et al., 2013). According to Modebelu and Nwakpadolu (2013), ability to use the appropriate pedagogical approaches in teaching agriculture is a way of ensuring that learners acquire basic knowledge and practical skills to equip them for agriculture-related jobs.

Nafees et al. (2012) believe that teaching approaches influence the presentation of a lesson to help the students learn the content, and this contributes profoundly to the student's performance (Ahmed et al., 2012). Furthermore, the selection of proper instructional approach ensures the effective achievement of the stated instructional objectives. Teaching approaches are therefore an essential component of teacher quality (Alexander et.al 2017). According to Ganyaupfu (2013), the approach to instruction makes a difference in how much a learner comprehends the content being taught and poor academic performance by students is primarily linked to the application of ineffective teaching approaches by teachers to impart knowledge to learners. Abbasi and Mir

(2012) notes that improper teaching approaches lead to students opting for surface learning where they tend to memorize and reproduce the content without necessarily fostering understanding of the content. Rote learning of the content by the students is usually associated with teaching approaches that are teacher-centred in which case the learners mostly get surface learning of the content. This may not be very useful to the learners when they attempt to apply the knowledge gained to solve real-life problems.

A study by Gurney (2007) revealed that learning is a consequence of experiences and teaching, therefore, should be about the formulation of appropriate and beneficial experiences so that learning comes about naturally and with certainty. Muthomi and Mbugua (2014) are persuaded that in usual practice, teachers do not use one particular teaching method but rather a combination of two or more methods in the delivery of the content which makes up the teaching approach that the teacher uses. According to Martin (2000, as cited in Hayes, 2014), teachers are expected to use appropriate teaching approaches that will enable learning to take place. This expectation on the teachers is despite the fact that they are free to choose the teaching approaches to use in implementing the official curriculum. This practice by teachers means that no two teachers are alike, and therefore, since all teachers are different, the teaching approach each teacher uses and the way they use them may depend on several factors.

Effective teaching approaches engages students in the learning process and helps them develop critical thinking skills. Traditional teaching approaches have evolved with the coming on of different instructional methods, prompting teachers to adjust their approach toward students' learning needs. The sustainable development goal number four which seeks to 'ensure inclusive and equitable quality education and promote life-long learning opportunities for all' as quoted by ICSU, ISSC (2015) is most likely to be achieved if training of skilled workforce in the agricultural sector can begin as early as when they are in primary and secondary school. This goal is likely to be attained if the agriculture subject teachers apply teaching approaches that are effective in making the learners acquire the necessary 'principles and practices' in agriculture. Olajide et al. (2015) claim that the way agriculture is taught has failed to make an impression on society.

A study done by Evelia et al. (2014) in Kenya revealed that some agriculture teachers teach by reading directly from textbooks and in some cases, there is unquestioning transcribing notes by learners from the board or textbooks. In most cases, such teachers offer very little practical work or demonstrations to their learners. Use of such teaching approaches does not build critical thinking in learners and there is very little creativity. While theoretical teaching may help the learners to pass the examinations taken at the end of the secondary school course, it may not help inculcate skills in the learners. Without skills, the learners may not be able to apply appropriately the

agriculture knowledge they have gained. This may have led to the notion that agriculture subject has failed to make an impression on the society (Olajide et al., 2015).

2.4 Grasha's Five Teaching Approaches

Grasha (2002) endorsed five teaching approaches that teachers may use for instruction. The teaching approaches are determined by the teaching/learning activities that take place during the execution of the lesson. Teaching approaches form the basis upon which the teacher plans and executes the lesson. According to Grasha (1996), the teaching approach a teacher uses in class can facilitate or hinder the learners' ability to acquire knowledge and skills. He also says that the teaching approach used may influence the learning styles adopted by the learners. The five teaching approaches show a continuum from teacher-centred approaches on one end to learner-centred approaches on the other end as indicated in Figure 1. The benefits and potential challenges of each respective teaching approach are also discussed.

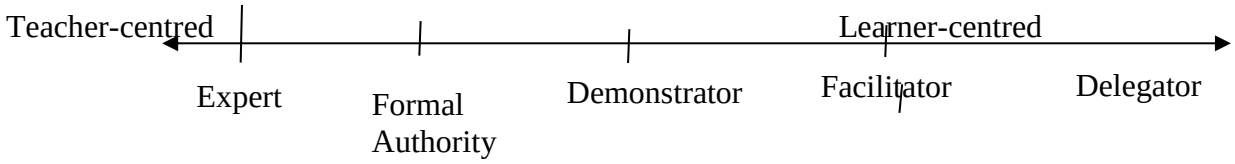

Figure 1: Grasha's Five Teaching Approaches.

(Source: Self)

The five teaching approaches in this study portray a continuum from the most teacher-centred teaching approach (expert) to the most learner-centred teaching approach (delegator). The debate for teacher-centred versus learner-centred teaching approaches has been on for a long time and what is emerging is to have a blended or hybrid teaching approach that will capitalise on the advantages of both the extreme teaching approaches. Aldajah et al. (2014) states that although individuals may have a dominant preferred teaching approach, they often mix with elements of the other teaching approaches.

2.4.1 Expert Approach to Teaching Agriculture

In this teaching approach, the teacher has the knowledge and expertise that the students need. The teacher's main concern is to transmit information and to ensure that the students are well prepared for examinations. Thus, the teacher perceives grades and tests as important (Amini et al., 2012) thus getting good grades becomes the focus. The teacher challenges the students to boost their competency. This teaching approach has the advantage of the teacher possessing the knowledge, information, and skills but on the other hand, the learners are passive recipients of

knowledge, and the teacher can intimidate the inexperienced learners if it is overused as the teacher strives to remain the expert (Grasha, 2002). The expert teaching approach is teacher-centred and frequently entails lengthy lecture sessions or one-way presentations. This approach, therefore, may be used for teaching the principles of agriculture, for example, concepts in agricultural economics, but it is not appropriate for learning practical skills since the learners are not given chances of trying out or practising the agricultural skills.

2.4.2 Formal Authority Approach to Teaching Agriculture

Students are expected to absorb information or take notes. The teacher feels responsible for providing and controlling the flow of the content and student participation in class is not required. The teacher tends to be strict and rigid and thus concerned with the correct, acceptable and standard ways of doing things (Grasha. 2002).

The teacher takes the approach of 'I teach, they learn' which is also referred to as 'chalk-talk' approach (Konyango et al., 2015). In this case, the teacher's concern is not to build relationships with their students although positive and negative feedback to the students is provided. According to Kaur (2011) this teaching approach is dominated by knowledge delivery, and it promotes student reliance on the knowledge which makes the teacher to be source of knowledge and the students are there to listen and take notes. LiYin (2010) concurs that the lecture method when it is the predominant teaching approach used limits the students' ability to understand fully. While this approach may be acceptable for certain higher education disciplines and settings with large groups of students, it is not suitable for teaching practical oriented subjects like agriculture since there is little interaction with the teacher.

2.4.3 Demonstrator Approach to Teaching Agriculture

This teaching approach is also referred to as Personal Model where the teacher runs teacher-centred classes with an emphasis on demonstration and modelling. This approach allows the teacher to retain the formal authority role while allowing the teachers to demonstrate their expertise by showing the students what they need to know (Grasha, 2002). The teacher acts as a role model and then guides or coaches the students by helping them develop and apply skills and knowledge (Amini et al., 2012). The teacher tends to be hands-on and encourages direct observation and emulation by the students.

In demonstrator teaching approach, the teacher encourages student participation, and the students are expected to take some responsibility for learning what they need to learn. One advantage of the approach is that the teacher has an opportunity to use a variety of resources,

including multimedia presentations and demonstrations. A study done by Auwal (2013) concluded that when a teacher demonstrates, the achievement by the students is higher than when the teacher uses class discussions. Although this teaching approach is suited for teaching several subjects, it is difficult to accommodate students' individual needs in large classes. The approach may be useful in teaching agriculture but can be enhanced by giving the students more opportunities to plan and carry out learning experiences which develop critical thinking.

2.4.4 Facilitator Approach to Teaching Agriculture

Facilitator approach is a student-centred approach that tends to focus on activities. This approach places more responsibilities on the students to take the initiative for meeting the demands of various learning tasks (Jabbour, 2013). According to Metzler (2011, as cited in Goodyear & Dudley, 2015) in facilitator approach the teacher's role is to act as a guide during the learning process. Goodyear and Dudley states that, "the major functions involve arranging the kind of learning environment that gives students some direction and a task to accomplish, then standing aside to monitor while students go about their task" (Goodyear & Dudley, 2015, p 278).

The teaching approach is suitable for students with independent learning, who can actively participate and collaborate with others in cooperative learning (Waiganjo et al., 2014: Zhan et al., 2015). The teacher designs group activities which bring about learning, student-to-student collaboration and problem-solving. The teacher's role is that of guiding learners in the right direction during the learning process.

The approach is ideal for teaching science and similar subjects since the students get to ask questions and develop skills to find answers and solutions through exploration. Teaching and Learning International Survey (TALIS) in 2009 recommended this approach to learning since it challenges the teacher to interact with students and prompt them toward discovery rather than lecturing facts and testing knowledge through memorization. In agriculture, this can be achieved through the problem-based approach to teaching. However, according to Jabbour, 2013, use of this teaching approach is often hindered by lack of resources and large class sizes or when space may be inadequate.

2.4.5 Delegator Approach to Teaching Agriculture

In delegator teaching approach, the teacher places much responsibility and control for learning on individuals or groups of students. Students are expected to design and implement their learning projects while the teacher takes a consultative role and is available when required as a resource person (Amini et al., 2012). The delegator teaching approach is suitable for a curriculum

that requires practicals or projects, such as agriculture, biology, and chemistry or subjects that warrant peer feedback, like debate and creative writing. This guided discovery and inquiry-based learning place the teacher in an observer role that inspires students by working together toward common goals, for example, projects. It is a teaching approach that is criticized as geared toward the teacher as a consultant who seems to be losing control over the learning process as is the case in the traditional authority figure (Grasha, 2002).

2.5 Teaching of Agriculture in Secondary Schools in Kenya

Agriculture subject has been shown to be important in increasing agricultural productivity. The subject should therefore be taught in such a way that the students are able to transfer knowledge and skills learned in their day-to-day experiences.

2.5.1 Relevance of Agriculture Subject

Teaching of agriculture in secondary schools covers agriculture principles and practices (Konyango & Asienyo, 2015). Research has shown that there is a positive correlation between secondary school agricultural education and farming productivity (Yasmeen et al. 2011; Kipkemei et al. 2012). Research finding by the Nanok et al. (2005) indicates that relevant basic education can help impart life skills which are useful in positively influencing agricultural productivity and thereby alleviating hunger and poverty. The teaching of agriculture in secondary schools, therefore, ought to be taken very seriously as this is likely to grow the economy.

While the National Food and Nutrition Security Policy acknowledges that 80 percent of the rural population work on the farms and that the majority of farmworkers lack basic skills in agricultural production, little attention is given to strengthening agricultural education in secondary schools (GoK, 2011). One suggestion given in the policy document is that of teaching of food nutrition in schools (not food production) and capacity building of those already working on the farms. The implication of this suggestion is that not enough emphasis is being given to the preparation of youth-in-school towards food production. Since research has shown that the knowledge and skills gained through participation in secondary school agricultural education is beneficial to individuals practising agriculture, it would therefore be prudent to equip the youth enrolled in agriculture subject in secondary schools with agricultural knowledge, skills, and attitudes necessary to offer food security solutions to the society.

Due to the perceived importance of agriculture as one of the drivers of economic growth, the Kenyan government has put more emphasis on the teaching of agriculture within the basic education offered to learners. There is positive effort towards including agriculture subject at all

levels of learning as seen in the CBC where the subject has been re-introduced in primary schools (RoK, 2017). According to the Basic Education Curriculum Framework (RoK, 2017), in the CBC, agriculture will be taught as a compulsory subject from grade 4 up to grade 9 after which it will be offered as an optional subject in grades 10 to 12. This means that only those learners after grade 9 who wish to develop a career related to agriculture will continue to study the subject. However, for the country to experience the expected outcomes of including agriculture in the school curriculum right from primary school level, equipping this learning area with the requisite resources including well-qualified agriculture teachers will be crucial.

2.5.2 Effective Agriculture Teachers

Effectiveness, according to the Collins English dictionary (2014), means the 'quality of being successful in producing an intended result'. The main purpose of teaching is to bring a necessary change in the learner usually taken to be observable behaviour in the learners (Ganyaupfu, 2013). In order to facilitate the process of transmitting the required skills, knowledge, attitude and values that will bring about this essential change in the learners, a teacher should apply appropriate teaching approach. A teacher should have the ability to choose the teaching approach that is suitable for specific learning outcomes and the level learning outcomes which will determine the quality of the graduates.

Teachers play an important role in the teaching and learning process thus effective teaching is largely a product of teacher effectiveness. 'Teaching effectiveness', 'teacher effectiveness' and 'instructional effectiveness' are terms that are often used interchangeably. This reveals that the main attribute of a teacher's work is instructional in nature and that teaching or instruction generally takes place in a classroom.

Dash and Barman (2016) describes teaching effectiveness as the ability of a teacher to help the learners to learn as opposed to what some take to be the role of the teacher; to cover the content. Roy and Halder (2018) give a more elaborate meaning of teacher effectiveness as 'the impact that classroom factors such as teaching approaches, teacher expectations, classroom organization and use of teaching resources have on students' performance'. Ko et al. (2013) agree with this when they posit that teacher effectiveness generally are 'all the teaching practices and classroom processes that promote better student outcome'. Teacher effectiveness, therefore, has always been one of the central themes of any education system. Since teaching effectiveness plays a key role in attaining quality education, agriculture teachers should embrace the use of appropriate teaching approaches in implementing the agriculture curriculum.

Studies have been done on teacher effectiveness in a bid to profile the characteristics of an effective teacher. For example, Roberts and Dyer (2004) listed the characteristics of effective agriculture teachers to include the ability to plan and execute lessons, using a variety of teaching approaches, providing students opportunities to learn among other characteristics. Ko et al. (2013) add to this list of attributes of an effective teacher by stating that an effective teacher is 'clear about instructional objectives', 'knowledgeable about curriculum content and the strategies for teaching it', 'communicates to students what is expected of them and why', 'makes use of available instructional materials to enrich and clarify the content', 'address higher and also low level cognitive objectives', and 'monitor students' understanding by offering regular appropriate feedback'. This is in agreement with Akiri (2013) who believes that teacher effectiveness is a 'multi-dimensional construct measuring a variety of different aspects of teaching' and Roy and Halder (2018) who maintain that 'no single teacher characteristic or attribute is enough to describe an effective teacher'. These aspects of an effective teacher can be summarized as the teacher's subject mastery, effective communication, lesson preparation and presentation and finally, evaluation of students' learning. Most authors, however, are in agreement that most of the characteristics of an effective teacher identified are in the area of instruction.

A measure of teacher effectiveness that is understood by all stakeholders in education is the academic performance of the learners. Akiri (2013) claims that the learning which occurs in class determines a student's academic performance. When explaining the meaning of teaching effectiveness, most authors are in agreement that effective teaching occurs when the instructional process focuses on student outcomes. Based on this consensus of teacher effectiveness as a focus on students' outcomes, analyses of students' performance, often measured using achievement tests, is taken to be an indication of teacher effectiveness (Ko et al., 2013). This explains why the majority of the stakeholders in education focus on the students' academic performance as a way of determining the teachers' and by extension the schools' effectiveness. Newcomb et al. (2004) assert that the evaluation of students' learning provides feedback concerning the effectiveness of the teaching approach used as well as the teaching resources used.

According to Michigan State University(n.d.), one of the performance areas of an effective agriculture teacher is the ability to choose and use teaching approaches that will give the desired results. Looking at the KCSE students' performance in agriculture, the results do not portray the learning objectives as having been fully achieved. This study aimed at showing how some of the factors (teacher, curriculum and institutional) correlates with teaching approaches used by agriculture teachers.

2.6 Teacher Factors and Teaching Approaches

Teacher factors are personal attributes that may influence the decisions made by the teacher concerning how to carryout professional or administrative duties. According to Darling-Hammond et al. (2017), of all the different factors that influence the quality of education, learning outcomes and eventually national development, teachers' effectiveness and teacher characteristics are the most significant. This is in agreement with other researchers who posit that the most important of the many factors that influence the quality of education is the teacher. For instance, Kimani, et al. (2013) states that the teacher is crucial as the person with the responsibility of imparting knowledge, skills and attitude to the learners. Gbore and Daramola (2013) add on to say that the success of any education system depends a lot on the teacher. Kosgei et al. (2013) reiterates by stating that the teacher has a great influence on classroom practices which then reflect on the learners as seen in their academic achievement. In addition, Ikeoji and Agwubike (2006) argue that it may be impossible to achieve the objectives of agricultural education no matter how good they are due to the poor delivery process of the content.

In their research, AITSL [Australian Institute for Teaching and School Leadership], (2014), postulates that teachers share the responsibility for preparing young people to lead successful and productive lives. Van der Pers and Helms-Lorenz (2019) acknowledges that teacher factors influence the teaching approaches used. Rotumoi and Too (2012) claims that teacher factors and especially teaching experience and academic qualifications have a correlation with students' performance as well as how the teacher relates to the learners.

As an interface between the curriculum and the learners, the teacher is very vital in curriculum implementation. Hayes (2014) noted that teachers are usually left free to choose the teaching approaches to use in relaying the content that the curriculum developers expect the learners to learn. This means that it is important to understand the reasons why teachers teach they way they do. Such an understanding can give directions as to how and what interventions need to be put in place to encourage teachers to use appropriate teaching approaches. This study intends to investigate whether selected teacher factors correlate with teaching approaches used by teachers in transmitting agriculture knowledge to the learners. The teacher factors considered in this study are teacher's age, gender, educational attainment, teaching experience regarding the number of years.

2.6.1 Teacher's Gender and Teaching Approaches

In a study concerning student-teacher gender interactions, Kuecken and Valfort (2012) suggest that two views have been provided to explain the educational relevance of a teacher's

gender. An aspect of the teachers' gender that is of interest in this study is whether the teacher's gender plays a part in determining how comfortable a teacher is in using some teaching approaches and not others. Teacher's gender may play out especially in the practical demonstrations of some aspects like restraining an animal, construction of farm structures, and so on. In their study on teacher effectiveness, Onyekuru and Ibegbunam (2013) reported that male and female teachers differ slightly in their teaching effectiveness. There also seems to be a conviction that teacher's gender correlates with the teaching approaches used (Akhmetova et al., 2017). However, the study intends to find out whether the teacher's gender influences the choice of teaching approach used in teaching agriculture.

2.6.2 Teaching Experience and Teaching Approaches

Studies on the effect of teacher's experience on students' performance have found a positive relationship between teacher's effectiveness and their years of experience, though the relationship is not always significant (Zuzosky, n.d.). A study done by Onyekuru and Ibegbunam (2013) on teacher effectiveness revealed that secondary school teachers who had five or more years of teaching experience were more effective than those who had less than five years of teaching experience. Kosgei et al. (2013) confirm that students taught by experienced teachers perform better than students taught by less experienced teachers. The explanation for this is that the experienced teacher has mastered the content and acquired skills to deal with different classroom situations (Grasha, 2002). Furthermore, a more experienced teacher can apply the most appropriate teaching approaches to particular topics.

Some authors suggest that while inexperienced teachers are less effective than the more experienced teachers, the benefits of experience level off after a few years of teaching (Kimani et al., 2013; Mazumder & Ahmed, 2014). The difference in effectiveness at the beginning is because new teachers may need to go through an adjustment period where they learn the art of teaching along with adjusting to the other aspects of a new job. Many studies have attempted to establish a relationship between teaching experience and teaching effectiveness with varying results and with no particular pattern.

2.6.3 Teacher's Academic Qualification and Teaching Approaches

Agriculture subject in secondary schools is being taught by professionally trained teachers (Konyango & Asienyo, 2015) but it is not clear whether the level of certification has any bearing on the teacher's effectiveness and more so the choice of teaching approach used. Findings related

to teachers' academic certificates; whether Diploma, Bachelor, Masters or Doctorate are inconclusive since evidence from different studies are contradictory (Kosgei et al., 2013).

Mixed results have been reported over time. Some studies show benefits of advanced degrees on students' performance (Abbasi & Mir, 2012) while others indicate that higher academic qualifications have no effect on teaching effectiveness (Cakir & Bichelmeyer, 2016; Jega & Julius, 2018). Some believe that teachers with high academic qualifications can deliver well since they are more equipped with content as well as can devise new teaching approaches, such as the use of information communication technology (ICT). This study intends to reveal whether the teacher's academic qualification has a significant influence on the choice of teaching approach used by the agriculture subject teachers.

2.6.4 Teacher's Age and Teaching Approaches

The relationship between a teacher's age and teacher effectiveness has solicited a debate for a long time, and several research studies have been conducted to establish any significance. A study done by Zafer and Aslihan (2012) found that older teachers aged 41 years and above were more effective in teaching and had better classroom management skills than the younger teachers in secondary schools. This view is supported by a different study by Aloka and Bojuwoye as quoted in Ismail, Arshad and Abas (2018) found that there is a significant difference in the decision-making process between the younger teachers and the older teachers. They state that younger teachers tend to make decisions without considering the context carefully and connected this to a lack of vast teaching experience while the older make better decisions and thus are more effective in their teaching. A later cross-sectional study by Nyagah and Gathumbi (2017) in Kenya found that older teachers are likely to be more effective in teaching than the middle age and younger teachers.

Sivasakthi and Muthumanickam (2012) posit that the younger teachers below 30 years of age, middle age teachers between 30 and 40 years and teachers above 40 years of age do not differ significantly in their teaching effectiveness. This study thus implies that a teacher's age does not make a difference in teacher effectiveness. According to Guancheng et al. (2015), the youth, though they lack experience, are the most productive in terms of service delivery. It is expected that though the young teachers would be very dedicated in implementing the agriculture curriculum, they lack the experience that improves teaching effectiveness. In conclusion, the various studies on teacher's age and teaching effectiveness are no conclusive, and this could be attributed to the complexity of human behaviour.

2.7 Curriculum Factors and Choice of Teaching Approaches

Curriculum in the narrow sense is taken to mean the course of study. In secondary schools, it is presented as the syllabus prepared by KICD (KIE, 2002). The secondary school agriculture teacher is expected to implement it within the stipulated time of four years. As the teacher covers the syllabus, there are other factors related to the curriculum that is not within the teacher's control but are likely to affect the way agriculture is taught. Some of the curriculum factors that will be addressed by this study include teaching load for the agriculture teacher, length of the syllabus, professional development activities and mode of assessing agriculture at KCSE level.

2.7.1 Agriculture Syllabus and Teaching Approaches

A syllabus guides subject teachers on the scope and sequence of the content to be taught to learners enrolled in a given subject. agriculture subject syllabus was developed by KICD (KIE, 2002) and is therefore the document that outlines what agriculture teachers are to teach within the four years course of secondary school agricultural education.

Kipkoech (2017) noted that pressure to cover the syllabus might hinder the teachers' effort of being creative in making use of student-centred teaching approaches. When the syllabus is perceived to be too long, the teachers may devise 'shortcuts' that may enable them to cover the syllabus on time. These 'shortcuts' may be in terms of using teaching approaches that help in syllabus coverage but in themselves do not enhance understanding or learning by the learners. INTO (2007) reports that some of the challenges teachers face in their effort to implement the curriculum include time management and curriculum overload. From the report, time is a scarce resource, especially when the class size is large because teachers may not have enough time to prepare for the lessons and execute the assessment activities as required by the school. This reality implies that the teacher uses the most convenient, easy to prepare teaching approach. In most cases, this happens to be lecturing approach which may not be appropriate for all the content taught in agriculture.

Student-centred teaching approaches are more time-consuming than teacher-centred methods such as direct instruction. The lecture may not be sufficient to achieve adequate understanding, but it helps to cover a lot of content within a short time (Mbirimtengerenji et al., 2015). This study intends to find out if, in the opinion of the teachers, the time allocated for syllabus coverage (four years) is adequate; or whether the pressure to cover the syllabus may be hindering them from using appropriate teaching approaches.

2.7.2 Teaching Load and Teaching Approaches

The curriculum-based establishment states that a secondary school teacher in Kenya should teach 27 lessons per week. This workload is the same for all teachers in various subjects, and the recommendation did not consider the processes involved in teaching a particular subject. According to Thobega et al. (2011), agriculture teachers are likely to find it difficult when such a policy is put in place since they are expected to carry out several tasks in line with the teaching of agriculture principles and practices. Some of the main tasks that an agriculture teacher is engaged in include teaching in class, conducting practical sessions in the laboratory or agricultural workshop and establishing and maintaining projects on the school farm.

In their study, Kimani et al. (2013) reported that where teachers have a workload of 25 lessons or less per week, the students registered higher mean scores. They concluded that a teacher's workload had a significant impact on students' academic achievement. Effect of teacher's workload was also acknowledged by Osagie and Okafor (2010) when they said that increased workload impacts negatively on teaching effectiveness and thus on the students' academic achievement. Kirimi et al. (2013) confirms that teacher's effectiveness is affected by excessive teaching workload. This study will establish whether the teacher's workload is correlates with teaching approaches used by the agriculture teachers. The workload determines time available to the teacher has for lesson preparation which is likely to affect the learning activities the teacher plans for the students.

Yelkpieri et al. (2012) state that a high teaching workload impact on the teacher's planning for the lesson, marking students work and assessment of students. High teaching workload means that the teachers find it a challenge in getting enough time to carry out all the professional responsibilities expected of them.

2.7.3 Agriculture Assessment at KCSE and Teaching Approaches

Mode of assessing agriculture at the National examination level has changed over time. Previously, the students used to sit for three papers, Paper 1-theory, Paper 2-practical, Paper 3-project but this changed in the year 2005 where agriculture students now sit for two theory papers and the project as the third paper. The practical paper was phased out in the assessment process. In the current situation of assessing agriculture students, Paper 3 (project) accounts for 10 percent of the final score while the rest, 90 per cent is from the written examinations (Mwiria, 2005). Hence, this mode of assessment puts more weight on factual testing instead of practical knowledge yet agriculture is a vocational subject whose main aim is to impart practical skills to the learners.

Hoque (2016) asserts that tests and examinations influence how a teacher teaches as indicated by the learning experiences executed in class. This author states that the impact of testing on teaching is referred to as washback. Washback is likely to occur where the educational system is examination driven. Teachers tend to teach to the test probably because school and teacher effectiveness is gauged on how well students perform in the examinations. To secondary school students, examination grades are important in determining their academic worth and progression to the next level of education.

Gerges (2001) posits that policy emphasis on the way students are assessed may propagate the belief that traditional instructional practices which are teacher-centred are more valuable than the learner-centred teaching approaches. Jabbour (2013), acknowledges that since the teachers may feel pressured to make the students pass examinations, the teaching approaches used are thus to make the students memorise the content. Gauging of teaching effectiveness using students' performance makes teachers and students to place more importance on good performance rather than in gaining skills hat can earn them opportunities for employment (Mwiria, 2005).

Adhikari (2017) states that assessment system can shape the choice of teaching approaches teachers adopt. Ur (2013) sheds more light on this issue by reporting that when there is a discrepancy between what the curriculum, through the syllabus, intends to be implemented and what the examination procedures tend to assess, a confusion among the teachers sets in. Since teachers' effectiveness is often gauged by how well students perform in examinations, teachers thus tend to focus on students doing well in the examinations. Agriculture assessment in Kenya tends to give more weight on theory given that Paper 1 and 2 (theory papers) in KCSE contribute to 90 percent of the total marks and the Paper 3 (project) contributes to 10 percent. This may give the teachers the impression that passing the theory papers is most important in having an outstanding performance in agriculture subject. This may contribute to the tendency for agriculture teachers to ignore teaching approaches that engages the learners in practical work. Ondigi et al. (2011) state that when classroom practices tend to be more academic, the education system ceases to equip the learners with the requisite skills. Teaching to pass examinations therefore fails to vocationalize agriculture as it is envisaged by the curriculum developers.

Ko et al. (2013) explain that teachers have different conceptions of teaching which include knowledge delivery, attitude promotion, ability development, examination preparation and conduct guidance. In Kenya, teachers are known to prepare their learners towards passing of examinations since the performance and reputation of schools and teachers is judged by the students' achievement in the examinations (Rind & Mari, 2019). Therefore, examinations tend to influence the teaching approaches that teachers use. Olatunji and Wigwe (2011) argue that when

examinations are mainly in writing, there is no incentive for real practical work. Since the practical paper was phased out as a way of assessing agriculture students, the question to ask is whether it could have a bearing on the choice of teaching approaches used by the agriculture teachers.

The 2-6-6-3 education system that is being implemented intends to do away with the use of National Examinations as a way of assessing individual learners but rather as a means of evaluating the curriculum itself (RoK, 2017). The assessment of the learners, as reported by Mucheru (2017), a senior curriculum development officer in Kenya, will be competency-based. With the teachers relieved of the pressure of making the students pass examinations but instead required to impart competency skills among the students, it would be prudent therefore to re-orient the agriculture teachers towards the use of student-centred teaching approaches that will help learners acquire the required skills and knowledge. The study will find out whether the mode of student assessment is related to the teaching approaches used by agriculture teachers. This will give an understanding as to whether the new competency-based curriculum's way of evaluation is likely to impact on the teaching approaches used by agriculture teachers.

2.7.4 Professional development activities and teaching approaches

It is said that the destiny of a nation is shaped in its classrooms (Gathumbi et al. 2013) and that the quality of an education system is determined by the quality of its teachers (Darling-Hammond et al. 2017). The Professional development activities (PDA) are forums where practising teachers update their content knowledge and pedagogical content knowledge, which is, the teaching skills (Akiri, 2013). The professional development activities are meant to help teachers adjust to new curricula, new research findings on teaching and learning and the needs of students (Akiri, 2013) or even government policies (Gathumbi et al. 2013). According to Mwiria (2005) lack of PDA means that teachers are not receiving new ideas and they instead continue to teach using the old obsolete knowledge that they have. Offering PDA to agriculture teachers gives them a chance to update themselves concerning knowledge content and pedagogical skills.

Oludipe and Oludipe (2010) state that many teachers find themselves in the midst of a curriculum change or curriculum implementation activities that they are not prepared for professionally. It is also worth noting that many teachers were educated in classrooms where the learners were expected to memorise facts, carry out carefully set practical work and then tested on their ability to reproduce the information and remember particular tasks. It is the same teachers with that educational background who are expected to teach differently than how they were taught as learners. The PDA comes in to seal the gap between what the teachers know and what is expected of them as curriculum implementers. It would be of interest to note how PDA is being

used to prepare agriculture teachers to receive, interpret and implement the 2-6-6-3 curriculum as well as take up government policies. For example, the 100 per cent transition of pupils from primary schools to secondary schools. Research done asserts that PDA is a significant need in the field of education as it helps the teachers to be more efficient in their work (Buabeng-Andoh, 2012; Facing History and Ourselves 2009).

Darling-Hammond et al. (2017) emphasized on the need for PDA since teachers face the pressures and demands for students to learn new skills and effective use of new information technologies which call for new teaching approaches to produce these skills. This demand for teachers means that they may be required to teach using approaches they were not themselves taught and hence the need for PDA. This could be a reality as secondary school agriculture teachers anticipate handling the first class under 2-6-6-3 curriculum in 2023. Auwal (2013) asserted that the education curriculum developers should regularly organize workshops and refresher courses for teachers. Gulamhussein (2013), in a report on teaching the teacher, emphasises the need to provide not just PDA for teachers but, effectiveness PDA is paramount. This author states that some of the PDA attended by teachers do not change them hence they continue teaching the same way they have always done.

The PDA helps in the exchange of ideas on relevant and innovative ways of teaching as well as making an input in the teacher's knowledge and beliefs about the curriculum, students, and self (Young et al., 2019). The PDA may, therefore, assist the agriculture teacher in finding the most suitable teaching approaches to use to teach agriculture students. The teacher, according to Auwal (2013), will be able to determine and plan for the best learning experiences for content delivery using the resources available. Some researchers confirm that there is a positive effect of PDA on students' achievement (Gulamhussein, 2013; Onyekuru & Ibegbunam, 2013).

Adequate preparation is necessary whenever there is a curriculum change. The 2-6-6-3 education system being implemented is a major change in the curriculum, which requires proper teacher preparation. The PDA can be the avenue through which the appropriate teaching approaches can be emphasized. This can go a long way in determining the success of the 2-6-6-3 education system. According to RoK (2017), the 2-6-6-3 education system is competency-based and it is intended to have the learners acquire skills as they learn 'how to do'. This will be different from the current education system is mainly knowledge-based and application of the knowledge was not necessarily being emphasised in most learning areas. This led to the teachers focusing on teaching approaches that would drill the learners towards passing examinations a fact that has been blamed for the high rates of unemployment and the employers complaining about the quality of

graduates at all levels of education. The employers are forced in some cases to spend resources in training the newly recruited graduates so that they acquire the requisite skills necessary for the job.

The government of Kenya's policy of 100 per cent transition of learners from primary to secondary schools was introduced in 2018. The 100 per cent transition policy is part of a global campaign to give all children access to 12 years of learning (Otieno & Ochieng, 2020). This policy together with subsidized basic education will ensure that as many citizens have access to basic education. As much as this is a positive move, it is important to ensure that the country does not lose out on gains made on improving the quality of education offered to the learners. As the Ministry of Education implements the '100 per cent transition' policy it is important to ensure that the learners not only have access to schools but also meaningful and high-quality education (Gathumbi et al., 2013). The implementation of this policy has posed numerous challenges to the teachers. For instance, large class sizes, increased diversity of learners, special needs students which the teachers may not be confident in handling and high teaching load. As the country prepares to have the 100 per cent policy take effect, the teachers should be prepared adequately and supported regularly through continuous professional development. If teacher preparation is not done correctly, policies no matter how well-intended they are, they may not fully achieve the required impact.

Hayes (2014) claims that lifelong learning for teachers is key in a successful education system and thus focused system of continuing PDA for teachers should be established. Teachers need to move with the trend in teaching approaches from teacher-centred to learner-centred. This study was intended to establish whether the PDA have any relationship with teaching approaches used by agriculture teachers. This is critical even as Kenya prepares to implement the new 2-6-6-3 education system and as the secondary school teachers implement the 100 per cent primary to secondary school transition policy.

2.8 Institutional Factors and Teaching Approaches

Institutional factors create an environment in which the teaching/learning process takes place. According to Kapur (2018), many educational reformers hold that the key to improving student performance lies in improving the school. Amoo and Disu (2012) contend that school characteristics affect students' performance and influence on the teaching approach used (Lawrence &Vimala 2012). Schools are expected to create an enabling environment for effective teaching and learning through the provision of necessary infrastructure and facilities (Adeyemi & Adeyemi, 2014). Understanding of the relationship between institutional factors teaching approaches used is therefore relevant. The institutional factors considered in this study are school

farm and especially farm size available for students' work, the support provided by the school administration particularly the funding of agricultural learning activities and allowing students' participation in academic activities outside of school, library facilities, and class size.

2.8.1 School Farm and Teaching Approaches

A school farm is to the agriculture teacher and learners what a science laboratory is to a science teacher and learners (Konyango & Asienyo, 2015). The teaching of agriculture should be as practical as possible if the learners are to grasp the skills that are expected of them. The farm is one of the resources that a teacher needs for establishing museum plots, demonstration plots as well as students doing agriculture projects in line with the syllabus.

The school farm should be a place where agriculture students can have experiential teaching of the subject. Evelia et al. (2014) and Kyule et al. (2016) note that the school farm enables the learners to translate the theory learnt into practical realities which helps to enhance understanding and retention. Some of the challenges around the use of the school farm include the fact that the agriculture teacher and the school principal may have different perspectives concerning the usage of the school farm. The school principal may view the farm as a source of income and hence consider giving a portion of it to the students as a waste of resources. On the other hand, the agriculture teacher views the farm as a useful teaching resource that is likely to enhance the teaching-learning process (Konyango & Asienyo, 2015; Ogunlade, n.d.). This difference in views about the farm indicates that the agriculture subject teachers face the fact that the school may not have or may not avail enough land for use by the agriculture teacher and the agriculture students for teaching and learning purposes.

2.8.2 Support by School Administration and Teaching Approaches

Support by the school administration is very crucial to the agriculture teacher given the learning activities that need to be planned for the learners to engage in. Nyamubi (2017), asserts that teachers view school administrators as facilitators and supporters of the teaching and learning process. After all, as Soper (2017) states, school administrators are in control of school's resources and how time is spent. These authors indicate that giving support to the teachers is very critical in making the teachers more effective in their work. This support is key when it comes to funding the projects and field trips which are significant teaching approaches for the agriculture teachers (Wootoyitidde, 2010). Allowing the students to go for the field trips may appear a trivial issue, but the agriculture teachers need to know that they have the support of the school administration.

The agriculture teacher may also perceive support by the school administration in terms of the 'free time' availed to the students to enable them to attend to projects on the school farm. The school's daily schedule indicates the students' engagement, and it spells out what the students should be doing moment by moment. In some schools, as the focus group discussions revealed, the daily schedule is so tight that the students lack time outside the normal class timetable when they can attend to project work on the school farm. Hence teaching approaches that will require follow-up outside the designated class time may be challenged by the school schedule thus becoming unpopular with agriculture teachers.

Agriculture teachers require other teaching aids like farm tools and equipment, prepared charts, preserved specimens and soil testing equipment. Abbasi and Mir (2012) emphasises the importance of physical equipment and teaching aids as having a significant positive impact on students' academic achievement. Inadequate teaching materials and infrastructure have been attributed to poor student performance (Adeyemi & Adeyemi, 2014). Schools should, therefore, invest in teaching and learning resources as a way of supporting the teachers and probably by doing so remove some of the obstacles that hinder the teachers from choosing and using the appropriate teaching approaches. Where the teacher is not accorded the necessary support, then some of the learner-centred teaching approaches may be out of reach.

2.8.3 School Library and Teaching Approaches

Ideally, a school library is a facility whose main purpose is to provide books and non-books materials in all subjects of interest to both the teacher and the learner (Owoeye & Yara, 2011). Even where basic textbooks are available, some schools often lack other additional instructional materials. The official textbooks are sometimes provided for students use in class but to be more innovative in teaching, the teacher requires additional reading materials. The extra reading materials are usually supplied through the library services in the school where the students can access other textbooks, agricultural journals and publications, newspapers, and magazines. (Owoeye & Yara, 2011). These materials, if available, can be used to train the students to know how to learn by themselves as they look for information when they need to (Uzuegbu & Ibiyemi, 2013).

Self-learning is a vital learning aspect for agriculture students as they will be trained on how to be proactive in solving problems (Baro & Eze, 2016). Most of what is taught in agriculture are intended for application to problems in real life. Besides, the extra material can be used to give class assignments, and diversify teaching approaches available for use by the teacher. Mutegi (2014) states that when a school library is adequately stocked with reference materials, it enhances

syllabus coverage. The school library, therefore, provides information, instils ideas and develops knowledge that is important to function appropriately in today's knowledge-based society (Uzuegbu & Ibiyemi, 2013).

2.8.4 Class Size and Teaching Approaches

Class size is one of the key features of a learning environment that is said to affect learning and which the teacher has little or no control over. Class size specifically refers to the number of students being taught by an individual teacher in a classroom. Class size is different from 'average class size' which is commonly calculated by dividing the number of students enrolled in a school or education system with the available classrooms (Great Schools Partnerships, 2014). Another term that is commonly used is the 'student-teacher ratio' (STR) which is used to express the relationship between the number of students and teachers in a school or an education system. To work out the student-teacher ratio, the 'full-time equivalent' (FTE) teachers is used. FTE means that all 'instructional staff' are counted as teachers. The instructional staff includes all those who contribute to the academic process of the learners directly, for example; librarians, laboratory technicians who may not be assigned traditional teaching roles rather they assist the teacher who has been assigned a particular class. This may not portray the actual number of students a teacher handles in class and Chingos (2013) states that 'the student-teacher ratio is nearly always smaller than the average class size'(p6). The student-teacher ratio is commonly used as a comprehensive indicator of the overall quality of a school or education system (Great Schools Partnerships, 2014).

In Organization for Economic Cooperation for Development (OECD) member countries, class sizes are of 15-35 students except for China whish has class sizes of up to 50 students (OECD, 2011). According to UIS (2012), in sub-Saharan Africa class size ranges from 26 to 70 compared to OECD member countries where class sizes are below 20 in the majority of countries. In Kenya, the recommended class size for effective teaching is 45 students (Ministry of Education & Ministry of Higher Education, Science & Technology, 2012). Class sizes may differ between schools where some schools have been seen to enrol a large number of students and other schools a moderate number. In Kenya, STR according to MoEST (2014) is 41:1 which has been surpassed by far as educational policies and reforms have been implemented. This situation of having large class sizes in public secondary schools in Kenya has escalated due to several factors; high population growth rate, and the implementation of education policies especially the '100 percent primary to secondary school transition' (MoEST, 2015).

A report by the National Council for Population and Development (2015) informs that the population growth rate in Kenya is 2.9 per cent and the population was projected to be 52 million

by the year 2020. The report stated that 28 per cent of this population is comprised of young people between the ages of 15-24 years. This indicates the burden that the schools have of accommodating the young people for them to acquire education. A major concern therefore is about the quality of education offered given that the resources, including human resource, are likely to be overstretched.

The education policies that have contributed to an increase in STR include; free primary education which the Kenyan government implemented in 2003 (Munyanga et al. 2010), free day secondary school education implemented in 2008 (Brudevold-Newman, 2017) and the recent policy of 100 percent transition of learners from primary to secondary schools (Ministry of Education, 2019). The '100 per cent transition policy' requires all learners who complete the primary level of education to proceed on to secondary schools regardless of the KCPE marks attained. Previously, those who fail to achieve a given pass mark would not be admitted into secondary schools. By implementing the 100 per cent transition policy, there was a sudden surge of the student population in secondary schools and the facilities and resources are overstretched (Wambui et al., 2019). Inadequate supply of teachers and lack of enough classrooms in public schools, for example, has led to some teachers teaching a huge number of students in their classes.

The changes within the education sector in Kenya as a result of policy implementation have led to an increase in the number of students admitted in public secondary schools. The day secondary schools are the worst hit because the majority of Kenyans who are not able to cater for boarding fees embraced the free day secondary education offered in public secondary schools. While the policies are meant to ensure that as many citizens as possible have access to basic education, this has not been commensurate with the expansion of schools in terms of facilities and resources, including human resource, necessary for teaching and learning.

Kenya's STR in secondary schools stands at 1:41 against the national target of 1:35 (Ministry of Education & Ministry of Higher education, Science & Technology, 2012). This implies that the classrooms have the number of students beyond the nationally recommended standards. This has implications not only in the classroom seating arrangement and sharing of resources but also in the choice of teaching approach used. Ndolo and Simatwa (2016), state that the quick expansion of student enrolment in public secondary schools has led to the overstretching of resources, STRs and student-classroom ratio beyond national standards. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (2012), the large class sizes in Kenya due to a fast-growing population does not match the available resources.

Yelkpieri et al. (2012) states that, there are several challenges associated with teaching large classes which include, lack of adequate classroom space for the teacher to organize various

activities in class, learners not being adequately involved in teaching and learning activities which is worsened by lack of enough resources and also reduced individualized attention to the students. Lack of individualized attention means that the weak students who would have otherwise been helped and maybe turned into better students remain in that state. This is likely to impact on students' performance in any given subject. The teachers in some schools feel overwhelmed by the large class sizes and this is likely to impact on the way teachers teach. Nartey (2018), declares that teachers may find it a challenge to vary the teaching approaches used a practice that may lead to boredom, less concentration and less understanding by the learners. Lack of varied teaching approaches may imply that appropriate approaches to teaching are not used most of the time and that students learning styles are not considered in the teaching and learning process.

Large class sizes pose a problem in physical involvement in learning where learners are required to manipulate and engage with learning materials or re-organize the seating arrangement to form a more suitable setting (Coleman, 2018). For instance, the agriculture teacher may desire to have students sit in small groups to perform certain activities, but where the classroom is congested, this poses a challenge since the movement of furniture and or students is curtailed. Pant (2013) states that class seating arrangement plays a role in determining the activities that the teacher can plan for the students. This is supported by Conrea et al. (2017) when they say that classroom seating arrangement affects students' participation in class. Large class sizes, coupled with scarce resources mean that the agriculture teacher may lack the means of having the students share the resources by students moving from one workstation to another where the class is congested. In such a scenario, distribution of the meagre learning resources in a way that all students have an opportunity to handle them becomes a real challenge. Large class sizes are therefore likely to influence the way agriculture is taught.

Zyngier (2016) and Marcus (2017) states that class size has an effect on learning outcomes with students seeming to benefit from smaller classes. Studies done by various researchers indicate that class size impacts the acquisition of both cognitive and non-cognitive skills (Gagne & Lenard, 2012). These research findings, according to Ninia (2010) means that in smaller classes, students can learn more academically and socially. In large classes, the students are likely to be 'off task' and not concentrate on the lesson. According to research, in small classes, the teacher is likely to use varied instructional approaches compared to the lecture method that is likely to be applied in a large class (UNESCO Institute for Statistics [UIS], 2012). Wong (n.d.) adds that the classrooms need adequate physical space to enhance the teacher's ability to interact with students. According to Germanos (2015), space is essential in determining how the instructor organises the teaching materials and the social space where the students and teacher interact.

However, some studies have yielded insignificant relationship between class size and instructional practices (Chingos, 2011) while other studies done by Krueger and Hanushek (2000) revealed that small class sizes do not significantly improve student academic achievement. They argue that a small class size is not likely to change the academic achievement of the students unless it is accompanied by a change in the teaching approaches being used by the teacher. Nartey (2018) opines the benefits of large classes both to a country and the school in that, it helps reduce the cost of building extra classrooms or schools as well as recruiting more teachers, there is high energy, fun and excitement, and students learn to work in groups. However, the same author agrees that teaching a large class is a challenge to the teacher in many ways including the choice of appropriate teaching approach to use. There seems to be a lot of controversy and researchers do not quite agree whether reduced class size improves students' academic achievement or not. This study intends to find out the influence of class size on the choice of teaching approach used by the agriculture teacher.

Kordjazi (2014) suggest that space available in the classroom is a 'silent language' that forms people's action and that the spatial dimension determines how people think about and relate to each other. It is therefore important to make classrooms, where learning takes place, as attractive and suitable as possible for learning. Tondeur et al. (2015) supports this when they state that the spatial organisation of a classroom can be associated with changes in teaching practices. They continue to suggest that the positioning and movement of the teacher in the classroom are important in classroom management and in the learning process. The restrictions offered by the walls and the floor space available can, therefore, provide opportunities or limitations in the ways a teacher can conduct the lesson. Therefore, when the class size increases but the classroom size remains static, the teachers may be forced to get coping mechanisms and one of them being a change in the way they teach where they are likely use of less appropriate teaching approaches.

2.9 Theoretical Framework

The theoretical framework that the study used was based on the Social Ecological Model (SEM). According to Kilanowski (2017) SEM was first introduced as a conceptual framework for understanding human behaviour by Urie Bronfenbrenner in 1970s and later formalized as a theory in the 1980s. Bronfenbrenner presented the theory by placing the individual at the centre of nested circles. The circles represent various systems that are likely to influence human behaviour. Mcleroy et al. (1988) thus developed the conceptual framework into a theory. The proponents of SEM suggest that individual behaviour is shaped by the social environment which has multi-levels of influence. These multi-levels are five in number, namely, individual, interpersonal, community,

organizational and public policy. The SEM has been used to understand human behaviour and also to propose interventions targeting multi-levels to support behaviour change (Communication for development, 2012). The SEM is illustrated in Figure 2 showing the five levels: individual, interpersonal, community, organizational and public policy.

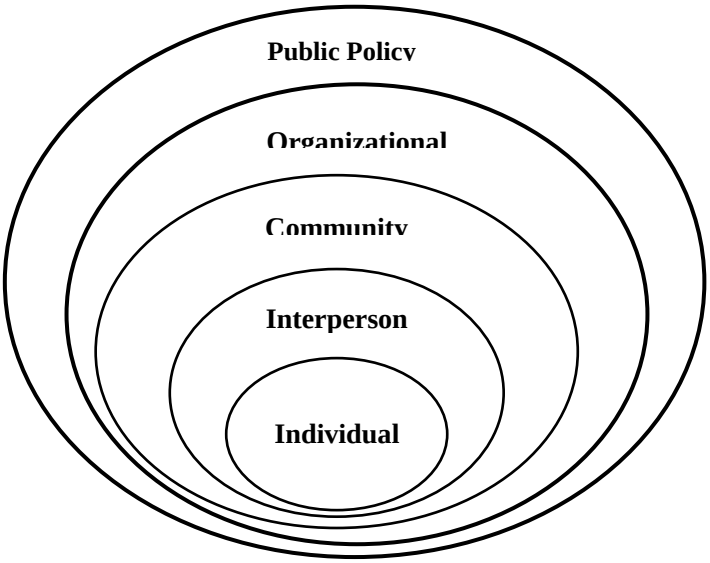

Figure 2: Illustration of the Social-Ecological Model
Source: Okoye (2016)

Max et al. (2015) have described each of the five levels whereby at the individual level, also referred to as intrapersonal, the advocates of this model believe that the characteristics of an individual are likely to influence behaviour. These individual characteristics include knowledge, attitudes, age, gender, economic status, self-efficacy, values, goals, literacy, and others. In this study, the individual level is represented by the selected teacher factors namely, age, gender, academic qualification and teaching experience. Previous studies by various researchers have indicated that these teacher factors are likely to influence the teaching practice of a teacher. For instance, Tyagi (2013) conducted a study on 'teaching effectiveness of secondary school teachers about their demographic characteristics'. The researcher found that teaching experience and teacher's qualification had a significant impact on teaching effectiveness. However, a similar study by Chowdhury (2014), demonstrated that there is no significant difference in teaching effectiveness among teachers with regards to teacher's gender, age, teaching experience and academic qualification. Seemingly, researchers have given conflicting views on the effect of teacher factors on teaching effectiveness. There is little information provided particularly on how teacher factors correlate with the teaching approaches used by agriculture teachers.

The interpersonal level encompasses the formal and informal social networks and social support systems that can influence individual behaviour. These include family, peers, co-workers,

friends, religious networks and others. This level of influence on an individual's behaviour is not considered in this study. Community is another level that can influence behaviour. In this aspect, community represents relationships among organisations, institutions, and informational networks within defined boundaries. Community as an influence on behaviour is not considered in this study.

The organisational level of influence into human behaviour comprises of organisations or social institutions with regulations and rules for operations that affect how or how well services are provided to an individual or group. This level of influence on human behaviour is considered in this study as institutional factors. However, only selected institutional factors were looked into namely, school farm, class size, school library and support by the school administration.

The public policy level involves the local, national or global laws and policies that may influence someone to behave in a particular manner. In this study, the policy level was informed by the curriculum that is formulated at the national level which the teachers are expected to conform to. The selected curriculum factors that were of interest in this study are teaching workload, syllabus, mode of assessing agriculture subject and professional development activities.

The study of human behaviour proposed by SEM is supported by other theories like the theory of reasoned action (TRA) developed by Ajzen and Fishbein (1980). TRA can be used to predict behavioural intentions and behaviour and provides a basis for identifying where and how to target strategies for changing behaviour. The proponents of this theory assume that individuals are usually rational and that they make systematic use of information available to them. In support of this, Odoyo et al. (2016) posits that TRA focuses on helping to understand people's intention to engage in a certain behaviour. In this study, the focus was on factors associated with the teaching approaches used by agriculture teachers.

The SEM's idea of what influences human behaviour is also supported by the Social Practice Theory (SPT) which recognises that behaviour is a result of various interconnected elements (Strengers, 2012). In particular, SPT emphasizes the material content within which the behaviour occurs. This implies that the school environment in terms of the technical infrastructure available is likely to be associated with the teaching approaches applied by agriculture teachers.

Therefore, the core concern is establishing the relationship between individual characteristics (teacher factors), social institutions (institutional factors) and Policy (curriculum factors) and teaching approaches used by the agriculture teachers. This may help deepen the understanding of why the agriculture teachers behave the way they do and how interventions can be formulated targeting teaching behaviour change. In this study, the behaviour of interest is the teaching approaches used by the agriculture teachers. The selected teacher factors that were

considered in this study are teacher's age, academic qualification, gender and teaching experience. The study has revealed whether variances in teacher factors being considered make any difference in the teaching approaches used by agriculture teachers.

The selected institutional factors to be considered are school farm, school library, class size and support by the school administration. The institutional factors are important in determining the resources available to the teacher for teaching purposes. In this case, the teacher considers what is available within the immediate environment (school) that can enable the use of a particular teaching approach. The institution's infrastructure may, therefore, be important in aiding the agriculture teacher to use appropriate teaching approaches.

The selected curriculum factors include the policies stipulated by the curriculum such as the teaching workload, content to be covered (syllabus), the assessment mode for agriculture subject and the professional development activities planned for the agriculture teachers. The policies are likely to influence the agriculture teachers to lean towards the use of certain teaching approaches depending on their demands. This study has shown curriculum factors that have a bearing on the teaching approaches used by the agriculture teachers in public secondary schools.

Since teachers are left to choose the teaching approaches to use freely, the SEM, TRA and SPT can be used to identify barriers and what advances the use of various teaching approaches (Southey, 2011). The SEM is thus suited to explaining or analysing the teaching behaviour (Armitage & Connor, 2001) of agriculture teachers with regards to the teaching approaches used. These theories, SEM, TRA, and SPT, are useful in helping to know what factors to target for there to be a change in behaviour (teaching approach).

2.10 Conceptual Framework

The conceptual framework relates the various factors considered in this study to the teaching approaches used by the agriculture teacher. In an ideal situation, there could be many other factors that may affect the teacher's decision of teaching approaches to use, but the study was limited to a few factors namely teacher factors, institutional factors, and curriculum factors.

As a theory-based framework for understanding the multifaceted and interactive effects of personal and environmental factors on human behaviour, this study used SEM to examine how some of the elements may relate to the teaching behaviour exhibited by teachers. The SEM levels considered in this study were individual (teacher), organization (institutional) and policy (curriculum).

At the individual level, the teacher factors that are considered in this study are age, gender, academic qualifications and teaching experience. Teacher factors are important in the choice of

teaching approaches to use since teachers are likely to consider their ability to make use of a specific approach to teaching. The curriculum factors, placed at the policy level, are handed down to the agriculture teachers by the curriculum developers and Ministry of Education, and this study investigated the association between teaching workload, the agriculture syllabus, mode of assessing agriculture and the PDA organised for agriculture teachers. The institutional factors, represented as the organization in the SEM, form the environment in which the teacher executes the teaching approaches. The factors within the teaching environment considered in this study are the school farm, class size, school library and school administration's support given to the agriculture teacher. The dependent variable in this study are the teaching approaches which has five categories, that is, the expert, formal authority, demonstrator, facilitator, and delegator approach. The interaction between the variables is represented in Figure 3.

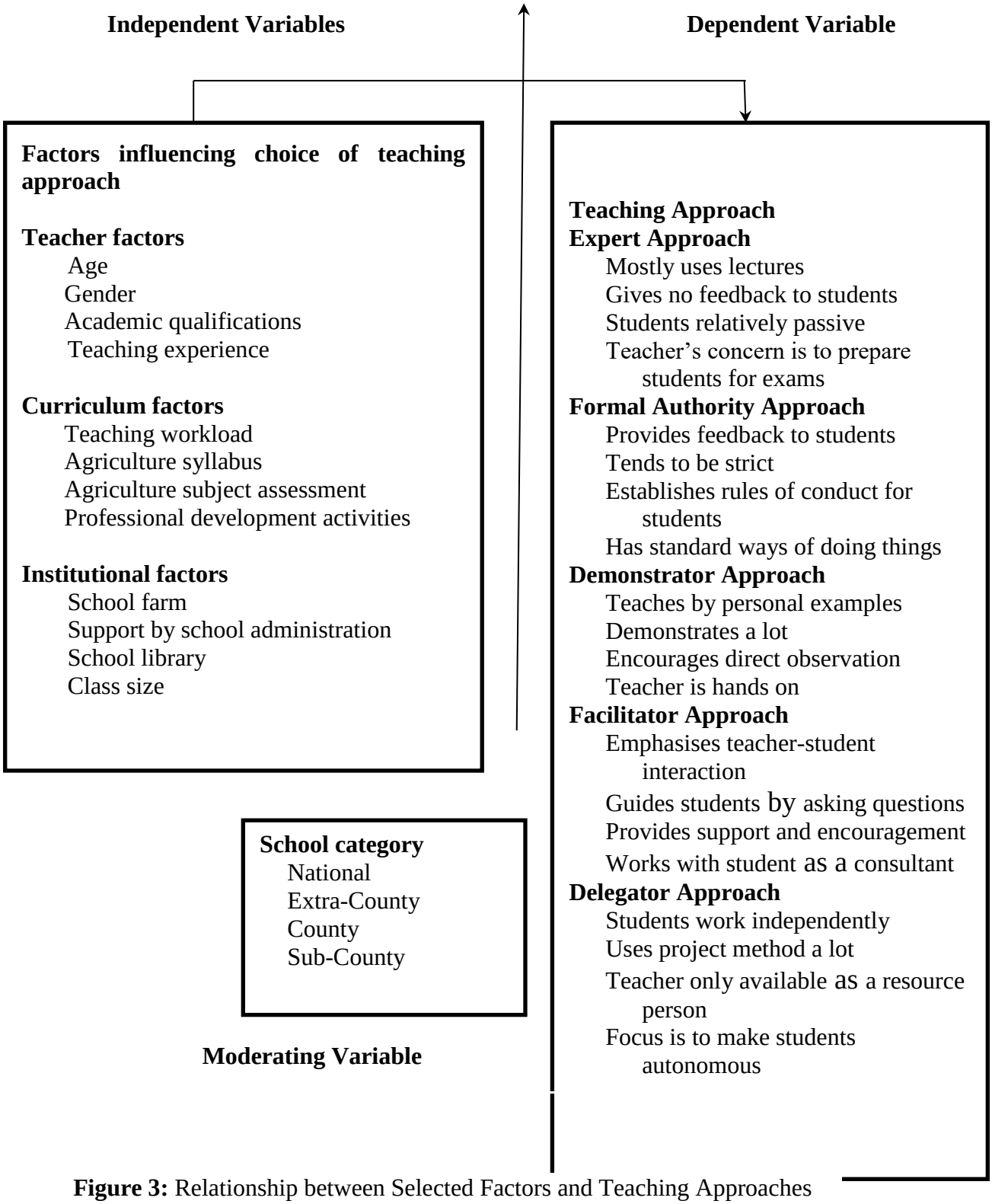

Figure 3: Relationship between Selected Factors and Teaching Approaches

Moderator variables are likely to affect the direction or strength of the relationship between an independent variable and a dependent variable (Aguinus et al., 2017). School category is a likely moderator variable, and therefore it was analysed in this study. Public secondary schools in Kenya

are categorized into four groups; National schools, Extra-County schools, County schools and Sub-County schools.

According to Oduor (2015), national public secondary schools in Kenya are centres of education excellence established to inspire education standards. From the author, there are 103 national secondary schools in Kenya and four of these schools are located in Nakuru county. The author also states that extra-county public secondary schools serve as second-tier national centres of education excellence. These schools are meant to complement the national public secondary schools in promoting integration and serving as examples of educational standards in their regions. Oduor (2019), explains that the county public secondary schools are boarding schools other than the national and extra county schools. They also include some day-schools found in major urban centers. The county schools' catchment is the host county. Sub-county schools are usually day schools that admit students from the host sub-county. Students in these sub-county public secondary schools commute from home. This classification of public secondary schools is likely to have a bearing on the quality and quantity of facilities and resources available in the schools. Availability and adequacy of facilities and resources are likely to impact on the teaching approaches adopted by agriculture teachers.

2.11 Research Gap

From literature review, a few research gaps were identified:

a. Research on teachers' teaching behaviour seems to be under explored and especially what seems to influence them.
b. Washback effects of mode of national examinations for agriculture (KCSE) on teaching and learning of agriculture
c. Understanding of the Competency Based Education system by agriculture teachers toward teaching of agriculture
d. Whether CBE will make a difference in the relationship between agriculture teachers' teaching beliefs and behaviour.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter documents the process which was followed to achieve the objectives of the study. It includes the research design, location of the study, target population, sampling procedures and sample size as well as instrumentation. Data collection procedures and statistical methods that were used to analyse data are also described. Finally, the ethical considerations observed during the study are outlined.

3.2 Research Design

Correlational research design was used in this study. A correlational study involves collecting data on two or more variables for each individual in a sample without manipulation and working out the correlation coefficient (Bordens & Abott, 2011). The purpose of correlational studies is to reveal relationships between naturally occurring variables through the use of correlational statistics. It is a useful research design in studying problems in education since it permits the study of relationships between many variables simultaneously (Edmonds & Kennedy, 2017).

Correlational research examines the relationship of responses to one question or a set of questions in a survey to another question or set of questions to discover relationships between variables (Beins & McCarthy 2012; Cohen et al., 2018). These authors further support the use of correlational research in explaining human behaviour or to predict likely outcomes. This research design can be used in investigating how several variables relate to a particular pattern of behaviour (Fraenkel et al., 2011). Thus, it is likely to give an understanding of why agriculture teachers use the teaching approaches that they employ through identification of relationships among variables. The advantages of correlational research include the fact that a researcher can analyze the relationship between several variables in a single study (Bordens & Abott, 2011; Gay et al., 2012). Secondly, correlational research not only shows whether there is a relationship or not between variables, but also the degree and direction of the relationship between the variables being studied. These advantages made the research design suitable for this study since the aim was to find out how several factors; teacher factors, institutional factors, and curriculum factors correlate with teaching approaches used by the agriculture teachers. Correlational research also helped to understand which factor(s) agriculture teachers consider in their decision making concerning the teaching approaches to use.

3.3 Location of Study

The study was carried out in Nakuru County which according to CIDP (Nakuru County, 2018), is an agriculturally rich county in Kenya. The county's agricultural background was shaped by the early white settlers in the pre-colonial days. From the CIDP, the arable land makes up 72.68 percent of the county's land area meaning that there is great agricultural potential to improve not only the food security status but also support economic development of the county. A list of economic activities in Nakuru constituency provided by Gachie (2018) reveals that the county grows a wide range of crops which includes food crops like maize, wheat, potatoes, carrots and cash crops like coffee, tea, flowers, pyrethrum. The main livestock reared includes poultry, sheep, dairy and beef cattle. These agricultural activities in Nakuru county indicate the possible areas where the youth who have studied agriculture are likely to engage in.

Data provided by National Population and Housing census shows Nakuru county has a population of 1.6 million and with a growth rate of 3.05 percent, the population is expected to reach 2.4 million by 2022 (Nakuru County, 2018). The youth, aged 15 to 34 years forms 37 percent of the county's population indicating the need to harness the potential of the youth. The Nakuru CIDP indicates that 22 percent of its labour force is unemployed and hence the county government intends to have measures in place to provide adequate employment opportunities.

One of the identified strategies is through capacity building for self-employment (Nakuru County, 2018). Capacity building in agriculture practice can begin in schools if the learners are taught effectively the agriculture content outlined in the syllabus to enable them acquire agricultural skills. The skills acquired can enable them to be self-reliant.

A study done by Ruforum and Egerton University (2015) indicates that more than 70 per cent of adults in Nakuru practice farming with the farmers age ranging from 20-90 years. This reveals that agriculture is a key economic activity in Nakuru County practiced by both the youth as well as the elderly. In addition, the study states that 36 per cent of the County's population is food poor and 60 per cent of the County's population is either directly or indirectly employed in the agricultural sector. One of the measures the County Government intends to implement to increase agricultural productivity is by involving the youth in agricultural projects. This plan by the County government can be made successful when the youth acquire basic agricultural skills by providing quality education as envisaged in its plan for the education sector (Nakuru County, 2018). These are skills that can be acquired if secondary school agriculture is taught effectively.

The County has the highest number of schools (5.04 percent of total schools in Kenya in 2018) compared to other counties and also the highest candidature (5.39 percent in 2018) in the Country (KNEC, 2019). The set up in public secondary schools in this county in terms of

infrastructure and human resource supply is similar to other counties. In Nakuru County, the students' performance in agriculture subject though slightly better than the country's mean, has not been impressive over the years. Data available from the County Education Office, Nakuru, indicates that student's average performance in agriculture subject in the county is 47 percent. (Appendix D). Though this performance by students in the agriculture KCSE performance is higher than the national mean of 38 percent, the outcome of the results is below the average 50 percent. The lowest examination mean for the County's student performance in agriculture subject was for the year 2016 which was an average of 33 percent an equivalent of D^+ (plus) in the Kenyan grading system.

Nakuru county has various school categories namely; national, extra-county, county and sub-county schools while the school types are; boys' schools for boys only, girls' schools for girls only and mixed schools that admit both boys and girls. Moreover, the public secondary schools have different modes of schooling depending on whether the students are day scholars, commuting from home every day or boarders residing within the schools.

3.4 Target and Accessible Population

The target population were all agriculture teachers in Nakuru county but the accessible population were the agriculture teachers in public secondary schools. The agriculture teachers are distributed in all public secondary school categories, school types and mode of schooling. Table 1 indicates the composition of secondary schools in Nakuru County by type and mode of schooling.

Table 1

Public Secondary Schools in Nakuru County by Type and Mode of Schooling

	School type			
Mode of schooling	Girls	Boys	Mixed	Total
Day	1	0	255	256
Boarding	16	11	5	32
Day/Boarding	0	0	12	12
Total	17	11	272	300

Source: Nakuru county education office (2016).

From a personal communication with the Deputy Director Teachers Service Commission (TSC) in Nakuru office (4thSeptember 2017), there were 296 agriculture teachers in Nakuru County distributed in 300 public secondary schools. The accessible population for this study were the agriculture teachers in all public secondary schools in Nakuru County. except Subukia sub-county which was used for pilot testing the instruments for data collection. There are 34 agriculture

teachers in public secondary schools in Subukia sub-county who were involved in the pilot study. Therefore 262 teachers in public secondary schools in ten sub-counties of Nakuru County formed the sampling frame.

3.5 Sampling Procedure and Sample Size

The list of agriculture teachers in public secondary schools in the ten sub-counties where the study was based formed the sampling frame. Stratified random sampling was used in this study to come up with the sample size. The agriculture teachers were placed in four strata based on the school category namely, national, extra-county, county and sub-county public secondary schools. Data collected from the Nakuru county's education office, the National secondary school category had six (6) agriculture teachers, while Extra-county, County and Sub-county had 16, 24 and 216 agriculture teachers respectively.

Stratified random sampling was done to ensure that agriculture teachers across the four school categories are sampled. The school category was taken as the strata with an intention of finding out whether it has any moderating effect on the relationship between the dependent and independent variables. As a moderator variable I found it prudent to find out if school category has any effect on the direction or strength of the correlation between the dependent variable and the independent variable. Random sampling was then applied to get the required number of agriculture teachers in each school category.

VanVoorhis and Morgan (2007) provide some general rules for determining sample size for a correlation or regression study. The authors make available formulae that can be used to determine sample size depending on the type of correlation analysis to be done. For testing multiple correlation, the formula $N \geq 50+8m$ (where m is the number of independent variables) can be used and $N \geq 104+8m$ used for testing individual predictors. In this study test for individual variables was intended, thus, the formula $N \geq 104+8m$ was used to determine the sample size. This study considered three independent variables hence using this formula; the sample size was worked out as follows:

$N \geq 104+8(3)$ which gives a sample size of 128 respondents

Mugenda and Mugenda (2003) recommend the sample size to be increased by at least10 percent to take care of non-response. In this study, there were an additional 20 per cent of 128 respondents to ensure maximum accuracy and to take care of the non-response. This gave a sample size of 154 respondents.

The 154 agriculture teachers were sampled proportionately from the four school categories. Table 2 shows the number of agriculture teachers in each school category, the percentage of

agriculture teachers in each school category and the number of teachers that were randomly selected in each school category.

Table 2

Proportional Sample Size by School Category

School Category	No. of Agriculture Teachers	Percent	Sample Size
National	6	2.3	4
Extra-county	16	6.1	9
County	24	9.2	14
Sub-county	216	82.4	127
Total	262	100	154

3.6 Instrumentation

The instruments that were used to collect data in the study were the Agriculture Teacher Questionnaire (ATQ), Focus Group discussion Guide (FGG) and Classroom Observation Guide (COG). The ATQ had four sections containing five-point Likert-scale items and it was administered to the randomly sampled agriculture teachers in the four school categories. This instrument required the respondents to rate their level of agreement with various statements. Section A, B, and C of the questionnaire was developed by the researcher and assisted in collecting data on the independent variables, that is, teacher, institutional, and curriculum factors respectively. Section D of the questionnaire was an adaptation of the teaching approach inventory developed by Grasha and Riechmann (1996). Items in Section D of the ATQ helped to find out the preferred teaching approaches used by the respondents.

The FGG had structured questions that were used to collect data from the agriculture teachers' group discussion as facilitated by the researcher. The focus group discussion enabled the collection of information that gave a better understanding of perceptions of agriculture teachers concerning the curriculum and institutional factors. The COG was used to capture the actual teacher and learner activities in an on-going lesson. This gave an insight into what teaching approaches the agriculture teachers use to teach agriculture subject.

3.6.1 Validity

The validity of an instrument is its ability to measure what it is intended (Bordens & Abott, 2011). Content validity, which Knapp (2013) refers to as expert judgement, was done by experts in Agricultural Education and Extension Department as well as Curriculum, Instruction, and

Educational Management Department both in the Faculty of Education and Community Studies of Egerton University. They were requested to examine the content validity of the instruments to ascertain that they have adequate content to sample what each was intended to measure. The validation by the experts helped to ensure that the items are clear enough and easily understood. Their suggestions in line with the study objectives were taken into consideration and the necessary adjustments made. Validation was also intended to assist in determining whether there is a need to include more items. From the comments of the experts who examined the documents, the items in the ATQ were found to be enough.

3.6.2 Reliability

Reliability is the degree to which an instrument consistently measures what it is supposed to measure (Bordens & Abott, 2011). Pilot testing of the instruments was done in public secondary schools in Subukia sub-county, one of the sub-counties of Nakuru County, which thereafter was excluded from the study. This is because the research permit given allowed the researcher to collect data from agriculture teachers within Nakuru County. Subukia sub-county was used for piloting based on the fact that it has the least number of schools and it is located at the edge of Nakuru County. The location of the sub-county together with minimizing the period between piloting and actual data collection helped reduce interaction between agriculture teachers in Subukia sub-county and the respondents.

Piloting was done in order to ascertain that the instruments are capable of producing similar results after a number of repeated administrations. The researcher randomly sampled twenty agriculture teachers from public secondary schools in Subukia sub-county for piloting the ATQ. Baker, as quoted in Hazzi and Maldaon (2015), recommends the use of 10-20 percent of main sample size as adequate for piloting. The twenty agriculture teachers were therefore adequate since they formed 13 percent of the main sample size (154). Pilot testing of the instruments was prudent in order to help address deficiencies and ambiguities of the items before the instruments can be used for actual data collection.

The reliability of the instrument was worked out using Cronbach's Alpha coefficient which is a measure of internal consistency that indicates how closely related a set of items are as a group. Adeniran (2019) states that Cronbach's Alpha coefficient is appropriate to use for reliability tests of instruments that have multiple-item measures of a concept like Likert scale. Items with low reliability were revised to improve reliability or removed altogether. According to Kopalle and Lehmann (1997) as cited in Ursachi et al. (2015), items with low correlation can be eliminated to increase alpha values and thus the internal consistency of a research instruments.

Reliability of a data collection instrument refers to its ability to yield consistent and stable measures. According to Creswell and Creswell (2018), reliability refers to stability or consistency of measurements; that is whether or not the same results would be achieved if the test or measure was applied repeatedly. The most commonly used test of reliability coefficient is Cronbach's alpha, which estimates internal consistency based on the average inter-item correlation. Cronbach's alpha reliability coefficient normally ranges between 0 and 1. The closer the value is to 1, the greater the internal consistency of the items (variables) in the scale.

The questionnaire used for this study measured three constructs; how the institutional (school), curriculum and teacher factors correlate with the teaching approach used by agriculture teachers. Institutional influence was measured using 20 questions and the scale had high internal consistency as determined by Cronbach's alpha value of 0.754. The second construct; curriculum factors had 13 items before piloting which gave a low Cronbach's alpha value of 0.63. Items that had a low reliability coefficient were removed and nine items for this construct were eventually used. The section after adjustment had a high internal consistency with Cronbach's alpha value of 0.724. Finally, teaching approach adopted by agriculture teachers which was measured using 25 items had a Cronbach's alpha value of 0.778. The findings are summarized on Table 3.

Table 3

Reliability Test for Research Variables

Research variable	Cronbach's alpha	No. of Items	Decision
Institutional factors	0.75	20	Accept
Curriculum factors	0.72	9	Accept
Teaching approach	0.78	25	Accept

Source: Field data

The overall Cronbach's alpha for the entire ATQ was 0.7 According to Fraenkel et al. (2011), a reliability coefficient of at least 0.7 is acceptable for social science research, a fact that is also supported by Taber (2018). Therefore, the Cronbach's alpha for the ATQ was taken to be appropriate.

3.7 Data Collection

An introductory letter from Graduate School of Egerton University (Appendix F) was obtained to allow me to seek a research permit from National Commission for Science,

Technology, and Innovation (NACOSTI) (Appendix G & Appendix H). The permit was to give access to public secondary schools in Nakuru county and contact the agriculture teachers to be incorporated in the study. After getting a research permit from NACOSTI, the Nakuru County's Education officer and the Nakuru County Commissioner were contacted to let them be aware of my intention. Permission was sort and granted from the two County offices (Appendix I & Appendix J). The school Principals were then contacted to seek their permission to interact with the agriculture teachers for data collection using the ATQ, COG and FGG.

The ATQ was then administered to the respondents across the four categories of secondary schools. This instrument allowed the researcher to collect information on the variables of the study. The respondents were requested to fill in the ATQ in order to provide the data required for the study. The questionnaire feedback was anonymous so that the respondents could give their opinions without any restrictions.

The researcher, with the help of the research assistant distributed 160 questionnaires to the sampled agriculture teachers. The agriculture teachers were requested to respond to the items in the ATQ. Out of the 160 questionnaires issued to the respondents for data collection, 154 questionnaires were returned. This gives a response rate of 96 per cent. According to Mugenda and Mugenda (2003) over 50 per cent response rate is adequate for analysis while over 70 per cent is rated as very good. Other authors like Nulty (2008) and Fincham (2008) agree that a response rate of 60 per cent and above is deemed to be adequate for data analysis. The response rate received in this study is thus rated as good and suitable for analysis.

The researcher also used FGG and COG tools to collect additional information relevant to the study from the agriculture teachers. The agriculture teachers' focus group discussions were conducted in order to obtain in-depth information about the variables being studied (Nyumba et al., 2018). Krueger and Casey (2015) suggest that 2-4 focus groups discussing the same topic are enough to provide adequate information. With the help of a research assistant, the researcher conducted three focus group discussions. The role of the research assistant was to register the participants, and keep accurate records of the discussions.

Krueger and Casey, (2015) recommend that for ease of participation in the focus group discussion, an ideal focus group should have 5-8 participants though a group can have a maximum membership of 12 participants. Focus group 1 had seven members made up of teachers from Rongai and Nakuru North sub-counties. Focus group 2 had seven members drawn from Nakuru East and Nakuru West sub-counties while Focus group 3 had 10 members all from Naivasha sub-county. The researcher made use of agriculture teachers who were willing to participate in the focus group discussion. The FGG was used to collect data from agriculture teachers' group

discussions as facilitated by the researcher. The data collected was analysed and used to corroborate the responses given by the respondents in the ATQ.

The third instrument was the COG. The researcher explained to the agriculture teachers the intention of classroom observation. This was done to seek consent from the agriculture teachers to allow the researcher to observe actual agriculture lessons. The researcher observed 10 agriculture lessons conducted by agriculture teachers who were willing to have the researcher sit in class as the lesson was on-going. The classroom observation was done across the four levels of learning, that is, Form 1, Form 2, Form 3 and Form 4 classes. The researcher was able to make a record of observations made following the COG. The researcher was a non-participant observer during the teaching and learning process in class. The COG was used to aid in capturing the actual teacher and learner activities in an on-going lesson. This gave an insight into what teaching approaches the agriculture teachers were using to teach agriculture subject. It also gave an insight into some of the challenges that agriculture teachers face especially those to do with class size, spatial and seating arrangement in the classroom.

3.8 Data Analysis

The data collected was entered, cleaned and scored to enable the analysis of the factors under consideration in this study. After cleaning the data, the study used 151 completed questionnaires for analysis. Upon analysis of the 151 completed questionnaires, the distribution of the respondents by school type was, 4 from national schools, 11 from extra-county, 15 from county and 121 from sub-county schools. The scores obtained from the ATQ were used to work out the median and mode of the questionnaire items and to test specific hypotheses at a statistical significance level of $\alpha \leq 0.05$. *Chi*-square, Cramer's *V,* and multinomial logistic regression statistical tests were used accordingly to ascertain relationship between dependent and independent variables. Cramer's *V* test was used for any relationship between dependent and independent variables that was found to be statistically significant at $p \leq 0.05$. Cramer's *V* coefficient gives the magnitude of a relationship between two variables, that is, one independent variable and the dependent variable.

Data provided by COG were analysed using descriptive statistics; median, mode, frequencies and percentages which were then used to corroborate the analysis of the ATQ. Focus group data was from the audio recording and notes taken during the group discussion. Data obtained from the focus group discussions were analysed using the group as the unit for analysis. The information was then categorized into general themes that helped to summarize data in line with the objectives of the study. The general themes identified and used to summarize data collected from the focus groups were; challenges faced by agriculture teachers, teaching workload, class size, school farm,

school library, school administration's support, PDA, agriculture syllabus and KCSE agriculture examination. The three focus group discussions were synthesized and data combined under the general themes.

Data analysis was done with the aid of Statistical Package for Social Sciences (SPSS). Table 4 gives a summary of the statistical tests that were carried out during the data analysis stage.

Table 4

Summary of Statistical Analysis used to Test Hypothesis

Hypothesis	Independent Variable	Dependent Variable	Statistical Tests
$H0_1$: There is no statistically significant relationship between teacher factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya	Teacher Factors: -Gender - Academic qualification - Teaching workload - Teaching experience	Teaching Approach	Chi-Square Cramer's *V* test Multinomial logistic regression
$H0_2$: There is no statistically significant relationship between curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya	Curriculum Factors	Teaching Approach	Chi-Square Cramer's *V* test
$H0_3$: There is no statistically significant relationship between institutional factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County, Kenya.	Institutional Factors	Teaching Approach	Chi-Square Cramer's *V* test

3.9 Ethical Considerations

In this study, several ethical issues that were likely to occur were considered. The ethical issues that were considered include; having informed consent of the participants, respecting the anonymity and confidentiality of the participants and respect for privacy. In addition, research permit was sought from NACOSTI to allow me to get into schools and interact with the agriculture teachers for data collection.

According to Fouka and Mantzorou (2011), an informed consent means that the participants knowingly, voluntarily and intelligently and in a clear way give permission to the researcher to collect information. To help the participants give an informed consent, the researcher explained the purpose of the study and why agriculture teachers need to participate. Consent was then sought from individual teachers at all stages of data collection.

Respect for anonymity and confidentiality was also considered. Fouka and Mantzorou (2011), state that anonymity is protected when the participant's identity cannot be linked with personal responses. The ATQ feedback was anonymous meaning that the respondents were not required to write their personal or school's name and therefore the information given cannot be linked to an individual teacher or school. The same authors give the meaning of confidentiality in research as a state in which information given by the respondents must be managed by the researcher in order to ensure that the participants are unidentifiable. The researcher dealt with this ethical issue by coding the ATQ in such a way that the information cannot be linked to an individual participant. The researcher assured participants in this study of confidentiality in the opening remarks of the ATQ and before embarking on the focus group discussions and the classroom observation sessions. Confidentiality is enhanced by storing safely the documents containing information collected from the participants.

The researcher also guaranteed the participants of respecting their privacy when sharing information with others. This is achieved by the researcher not revealing the identities of the participants or schools where the respondents are stationed when writing reports or in discussions about the study.

A research permit was obtained from NACOSTI allowing me to collect data from the agriculture teachers. In addition to the research permit obtained, I sought permission from the County Director of Education and the County Commissioner, Nakuru county to move within the county, visiting schools for the purpose of collecting data from agriculture teachers.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter contains discussions on the demographic information about the study population as well as the characteristics of study variables, which are; teacher factors, curriculum factors and institutional factors as the independent variables and the teaching approaches as the dependent variable. The results of hypotheses testing are presented in this chapter together with the findings of relationships between the independent variable and dependent variables.

4.2 Demographic Characteristics of Agriculture Teachers' Distribution

Agriculture teachers in Nakuru County were the respondents in this study that sought to investigate the relationship between selected teacher, school and curriculum factors and teaching approaches used by agriculture teachers. It was, therefore, imperative to first establish the demographic data of the respondents as that formed the basis for confirmation that the respondents were not a biased representation of the entire population (Creswell, 2015). The demographic analysis in this section shows the number and percentages of agriculture teachers from various sub-counties in Nakuru County that formed the sample used in the study.

To ensure that there was minimal bias in measuring agriculture teachers', institutional and curriculum factors' relationship with teaching approaches used by agriculture teachers, it was essential to take into consideration variations in terms of school category (National, Extra-county, County and Sub-county), school type (Boys, Girls or Mixed schools) and mode of schooling (Boarding, Day or Day/Boarding). This section details the distribution of agriculture teachers by sub-county, school type, school category, and mode of schooling.

4.2.1 Distribution of Agriculture Teachers by Sub-Counties

The study was carried out in Nakuru County which is made up of eleven sub-counties from which the respondents were drawn. The number of agriculture teachers who participated in the study were 151. The distribution of the respondents by sub-county was as presented in Figure 4.

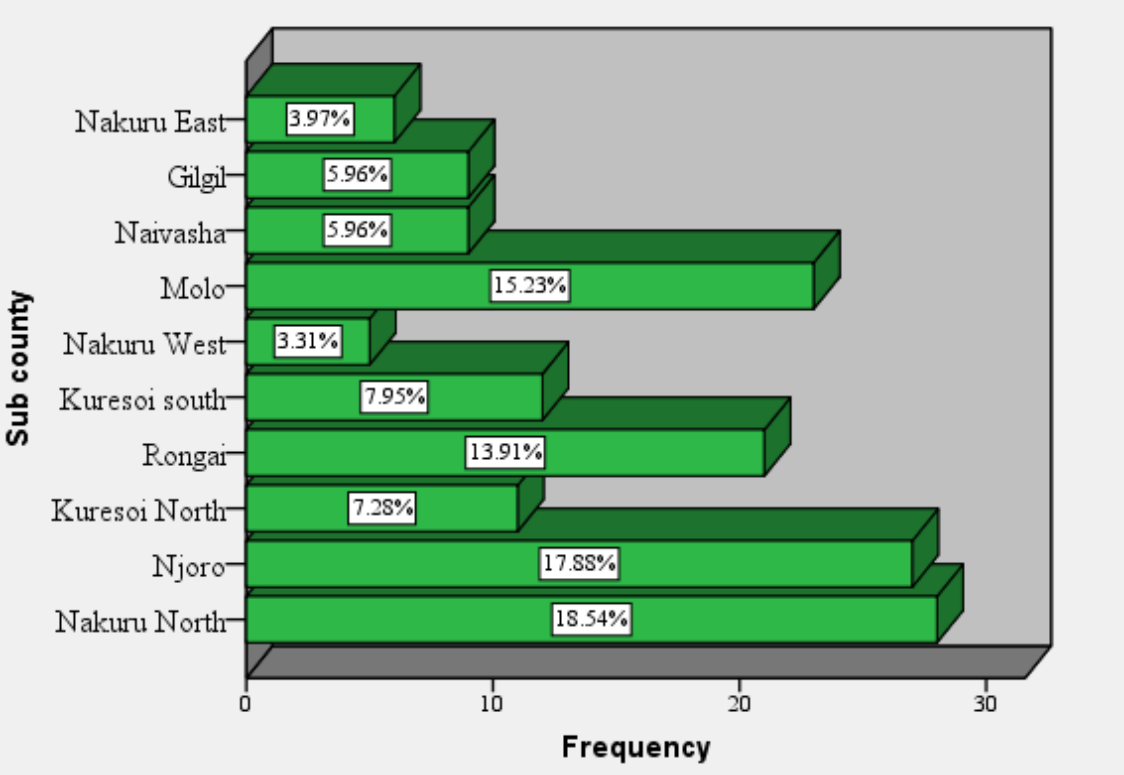

Figure 4: Distribution of Respondents by Sub-County

Figure 4 reveals that Nakuru North sub-county had the highest percentage, 18.54 percent of agriculture teachers who participated in the study, followed by Njoro with 17.88 percent. Molo and Rongai had 15.23 percent and 13.91 percent respondents respectively. The other sub-counties namely Kuresoi South, Kuresoi North, Gilgil, Naivasha, Nakuru East, and Nakuru West had 7.95 percent, 7.28 percent, 5.96 percent, 5.96 percent, 3.97 percent, and 3.31 percent respondents respectively. Subukia sub-county was left out since it was used for piloting. The varying number of respondents from the different sub-counties could have been due to differences in number of agriculture teachers in sub-counties as indicated in the records from the TSC office, Nakuru county. The difference in numbers could also be due to agriculture teachers' willingness to be involved in the study.

Teaching approaches adopted by agriculture teachers in a sub-county may be similar or different from teaching approaches espoused in other sub-counties. Hence to ensure that the sample is representative of the entire agriculture teachers' population in Nakuru County and that there was no bias in this study, teachers were sampled from all sub-counties within Nakuru County.

4.2.2 Distribution of Agriculture Teachers by School Category

The respondents in this study were drawn from all the four categories of public secondary schools in Nakuru County. The school categories are national, extra-county, county and sub-

county public secondary schools. Figure 5 shows the distribution of respondents by school category.

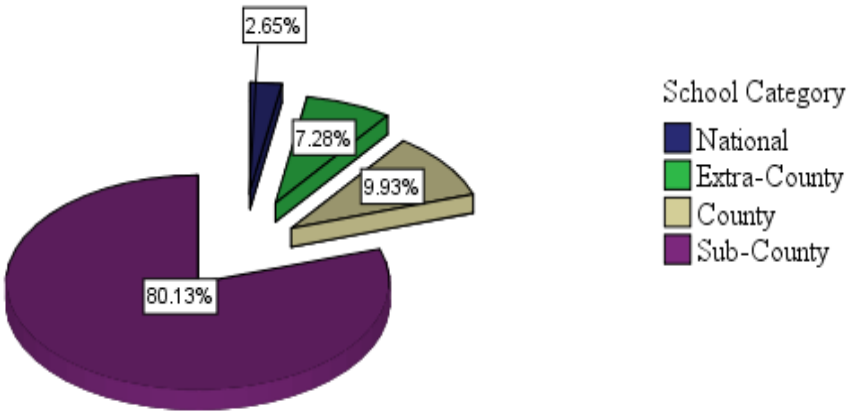

Figure 5: Agriculture Teachers' Distribution by School Category

It is evident from Figure 5 that the sub-county public secondary schools had the highest number of respondents 80.31 percent. This was expected since agriculture teachers in sub-county schools form 82.4 percent of the total accessible population in this study. Extra county and county schools had 7.28 percent and 9.93 percent respondents, respectively in this study. National schools had the fewest number of respondents 2.65 percent which was expected since Nakuru County has only four national secondary schools with only six agriculture teachers. The six agriculture teachers in national public secondary schools form 2.6 percent of the total accessible population in this study.

4.2.3 Distribution of Agriculture Teachers by School Type

There are three types of public secondary schools in Kenya, specifically; Girls schools, Boys schools, and Mixed schools. The study drew respondents from all the school types as indicated in Figure 6.

Figure 6 indicates that the highest number of respondents 76.16 percent were from Mixed secondary schools. This is in line with the fact that Mixed secondary schools are the majority making up 91 percent of the public secondary schools in Nakuru County.

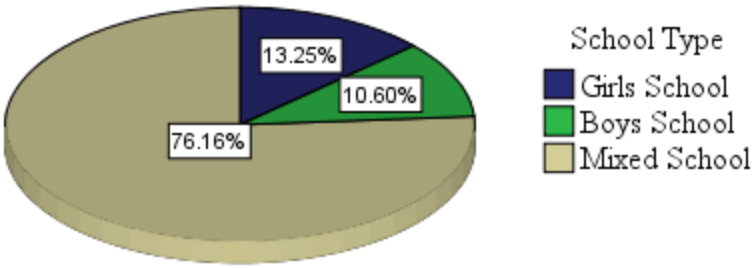

Figure 6: Agriculture Teachers' Distribution by School Type

The girls' and boys' schools contributed to 13.25 percent and 10.60 percent of the respondents respectively. This corresponds with the fact that Girls' schools and Boys schools make up 5.6 and 3.6 percent of the public secondary schools in Nakuru County respectively.

4.2.4 Distribution of Agriculture Teachers by Mode of Schooling

As far as the mode of schooling is concerned, the public secondary schools are divided into three namely; Day schools, Boarding schools, and Day/Boarding schools. To ensure that the sample size was representative of the entire population, respondents from all three different modes of schooling were included. Figure 7 presents the distribution of the respondents by mode of schooling.

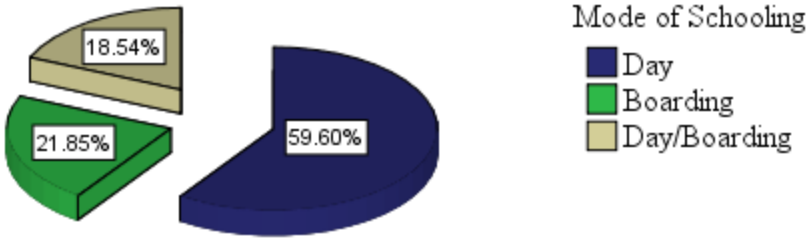

Figure 7: Agriculture Teachers' Distribution by Mode of Schooling

Figure 7 shows that most of the respondents were from day public secondary schools, 59.6 percent. Most of the sub-county schools, which form the majority of public secondary schools, are day secondary schools. Boarding public secondary schools had 21.85 percent of the respondents while Day/Boarding public secondary schools had the least number of respondents, 18.54 percent. In Nakuru county, the Day schools form 85.3 percent of all the public secondary schools while the Boarding and Day/Boarding schools make up 10.7 percent and 4 percent of the public secondary schools in Nakuru county.

4.3 Teaching Approaches in Agriculture

The teaching approaches are the dependent variable in this study, and the researcher sought to find out the teaching approach that agriculture teachers prefer to use. In this section, the analysis of responses to items on the ATQ that dealt with teaching approaches (Appendix A, Section D) is discussed. The section had 25 Likert scale items that the agriculture teachers responded to. The five different types of teaching approaches are; expert, formal authority, demonstrator, facilitator, and delegator teaching approaches Analysis of items in the ATQ was done in order to find out the preferred teaching approaches of agriculture teachers in Nakuru county. In addition to the ATQ, two other instruments namely; COG and FGG were used to collect supplementary information. Information gathered from COG and FGG was used to supplement the findings from the analysis of the items. (Appendices F&G)

To establish various teaching approaches adopted by agriculture teachers, the respondents were requested to give their perceptions on the twenty-five items that measured the extent to which they used different teaching approaches. There were five items addressing each teaching approach to which the respondents gave their responses regarding how much they agreed or disagreed with each item. The items were on a five-point Likert Scale measurement with the range being; Strongly Disagree, Disagree, Undecided, Agree and Strongly Agree.

The items were analysed to show the frequency of the responses in order to work out the preferred teaching approaches for agriculture teachers. The researcher grouped the items into the five teaching approaches and the results are discussed in the following sections.

4.3.1 Expert teaching approach in agriculture

The five items dealing with the expert teaching approach were isolated for analysis. The items focused on what the teacher considers important for the learner to know, whether they consider themselves as the main source of information for the students, coverage of the syllabus to prepare for examinations, prominent use of lecture method, and how knowledgeable they were on the content they taught. The analysis of the five statements covering expert teaching approach is presented on Table 5. The respondents gave perceptions on their level of agreement by choosing one among the five responses given namely; Strongly Disagree (SD), Disagree (D), Undecided(U), Agree (A) and Strongly Agree (SA).

Table 5

Analysis of Expert Teaching Approach

Items		Response in frequencies and percentages					
		SD	D	U	A	SA	Total
I give facts as the most important things that students should acquire	freq.	5	14	5	75	52	151
	%	3.3	9.3	3.3	49.7	34.4	100
What I have to say about a topic is important for students to acquire a broader perspective on the issues in that area.	freq.	6	17	11	93	24	151
	%	4.0	11.3	7.3	61.6	15.9	100
I want students to finish the syllabus well prepared for examination in agriculture	freq.	6	6	10	80	49	151
	%	4.0	4.0	6.6	53.0	32.5	100
Lecturing is a significant part of how I teach each of the class sessions	freq.	6	12	8	93	32	151
	%	4.0	7.9	5.3	61.6	21.2	100
There is more material in most topics than I have time available to cover it.	freq.	16	47	10	59	19	151
	%	10.6	31.1	6.6	39.1	12.6	100

Table 5 shows the results of the analysis done on the expert teaching approach where 49.7 percent of the respondents agreed and another 34.4 percent strongly agreed that they consider giving facts to the students as most important. This implies that majority of agriculture teachers (84.1 percent), comprised of those who agree and those who strongly agree, are in consensus that they give a lot of factual information to the agriculture students. Only 9.3 percent of agriculture teachers disagreed and in addition 3.3 percent who strongly disagreed with the item. This suggests that a number of agriculture teachers may be considering themselves as experts who should give a lot of agriculture information to the students in line with the syllabus.

When asked to respond to whether they consider what they say about a topic as important for students to acquire a broader perspective on the issues in that area, 61.6 percent of agriculture teachers agreed with the item while 15.9 percent strongly agreed. This is supported by the classroom observation analysis, where 80 percent of the agriculture teachers observed mainly gave facts to learners. This observation implies that the agriculture teachers maybe considering themselves as the sole source of information for students in learning agriculture making their approach to teaching predominantly teacher-centred. The learners thus are likely to develop a dependency on the teachers as they give the content implying that explorative teaching approaches where learners discover for themselves, are hardly used.

Over dependence on the teacher should not be encouraged if certain aspects of learning such as critical thinking are to be developed adequately in the learners. Besides, the expert teaching approach encourages passivity of learners whereby they are only expected to take notes and absorb information (Gill, 2013). Passivity of learners in the teaching and learning process often leads to surface learning where deep understanding of the content is not achieved.

The analysis indicates that, 61.6 percent of the respondents agreed and 21.2 percent strongly agreed that lecturing is a significant part of how they teach each class. This concurs with the classroom observation where 80 percent of the agriculture teachers moderately used or mostly used lecturing significantly as a means of communicating agriculture content to the learners. From the focus group discussions, the participants expressed that they majorly use lecturing, but sometimes this is due to the challenges they face in trying to execute their professional duties. Participants in the focus group discussions stated that the challenges that prompt them to use more of teacher centred teaching approaches are lack of sufficient land, lack of adequate school administration support, large class sizes, high workload, extensive syllabus as well as lack of double lessons allocated for agriculture subject. LiYin (2010) states that when expert teaching approach is used as the predominant way of teaching, it not only hinders understanding of the content being taught but also hinder learners' cognitive and psychomotor growth.

Kaur (2011) suggests that teacher centred teaching approaches with lecturing being a main teacher's activity may be used to cover a lot of content in a short period. It is also an easier teaching approach to use than other methods. This may explain why the agriculture teachers use lecturing mostly to teach since they claim that the agriculture syllabus is too wide. However, Kaur further declares that where lecturing is the main activity in class, the learners are made to be passive and boredom can set in. This is more so if the teacher merely repeats facts that are presented in the students' textbooks. Moreover, this approach does not develop problem-solving qualities in the learners. Therefore, the challenge for agriculture teachers is to use teaching approaches that will encourage learners to search for information rather than depend on the teacher to provide all the information.

When asked to state their perceptions on their desire to have students finish the syllabus and be well prepared for examination in agriculture, Table 5 indicates that 53.0 percent of the respondents agreed and a further 32.5 percent strongly agreed with the item. However, 6.0 percent disagreed and another 6.0 percent strongly disagreed with this item. The agriculture teachers' response to this item implies that their focus is on passing exams and not necessarily on the acquisition of agricultural skills by the students. Therefore, preparing students for examinations is very important to them. Focus on examinations is sighted as one of the weaknesses of the 8-4-4

education system in Kenya that has necessitated a change to CBE (Amutabi, 2019). When the teachers aim is to make the students pass in examinations, agriculture teachers may use teaching approaches that are geared towards drilling the students for better grades.

On the item asking whether preparing students for agriculture examination is important, 53 percent agreed that this is significant, implying that the teaching approaches used are likely to be those that drills students towards passing examinations as opposed to acquisition of skills. Expert approach to teaching is one of the approaches that can be used to give the learners a lot of content which they are expected to reproduce during the examination time.

The analysis displayed on Table 5 indicates that 39.1 percent of the agriculture teachers agreed and 12.6 percent strongly agreed that they have more content in most topics than time allows for coverage. This implies that a total of 51.7 percent of the teachers feel that they are knowledgeable in the topics to be covered which is a positive aspect about them. Agriculture teachers may be viewing themselves as 'experts' whom the learners should look upon as a source of knowledge. This is a positive statement that shows that the agriculture teachers are knowledgeable in the subject, but on the other hand, they may end up intimidating the less academically endowed learners with too much information.

The results agree with authors who state that agriculture teachers tend to use lecture method in teaching agriculture which is closely linked with expert teaching approach. Aholi et al. (2018) state that there is frequent use of lecture method among agriculture teachers in Kenya. This fact is supported by Evelia et al. (2013) who found similar results in a study conducted among secondary school agriculture teachers.

4.3.2 Formal authority teaching approach in agriculture

The five items used to measure the construct on formal authority teaching approach were on providing feedback to students, taking responsibility of how students learn, being strict, establishing rules of conduct for students and standard ways of doing things. These items were analysed and the results of the analysis are presented on Table 6. The respondents gave perceptions on their level of agreement by choosing one among the five responses given namely; Strongly Disagree (SD), Disagree (D), Undecided(U), Agree (A) and Strongly Agree (SA).

Table 6

Analysis of Formal Authority Teaching Approach

		Response in frequencies and percentages					
Items		SD	D	U	A	SA	Total
Students would describe my standards	freq.	8	43	18	67	15	151
as somehow strict.	%	5.3	28.5	11.9	44.4	9.9	100
It is my responsibility to define how	freq.	16	26	20	62	27	151
students must learn	%	10.6	17.2	13.2	41.1	17.9	100
I provide very clear guidelines for how I	freq.	3	6	3	67	72	151
want tasks completed in this class	%	2.0	4.0	2.0	44.4	47.7	100
I usually give students comments on	freq.	19	49	16	50	17	151
their performance	%	12.6	32.5	10.6	33.1	11.3	100
My expectations of what I want the	freq.	8	19	16	85	22	150
students to do in this class are clearly	%	5.3	12.6	10.6	56.3	14.6	99.3
defined in the syllabus							

Upon analysis of formal authority teaching approach, Table 6 indicates that 47.7 percent of the respondents strongly agreed and 44.4 percent agreed that they provide very clear guidelines for how students are to perform tasks. This implies that a high proportion of agriculture teachers give guidelines which they expect the students to adhere to. Agriculture teachers see it their responsibility to define how students learn by 41.1 percent agreeing and 17.9 percent strongly agreeing. The analysis also indicates that 44.4 percent agree and 9.9 percent strongly agree that students view their standards as strict. From the classroom observation, learners in 90 percent of the classes followed the teacher's instructions with little room for making decisions about their learning. This implies that learners are not being trained to be creative and critical thinkers. Only 33.1 percent of the respondents agreed that they give students feedback on their work while 32.5 percent disagreed on the same. This indicates that feedback to students is not being given as often as required. This is contrary to the classroom observation where 80 percent of the agriculture teachers gave feedback in a manner that encourages the students. This contrast probably indicates that the agriculture teachers are not aware of the different ways that a teacher can give feedback in class. Feedback, when given in a positive way, can motivate the learner and also provide an opportunity to close the performance gap (Mamoon-Al-Bashir & Kabir, 2016; McFadzein, 2015).

In determining what to teach, 56.3 percent of the respondents agreed and 14.6 percent strongly agreed that they follow the syllabus requirements. This is expected since the syllabus

provides a predetermined course of study to be followed and it is upon the stipulated content that the examinations are based. Such teachers who play by the rule feel that it is their responsibility to provide and control the flow of content (Aldajah et al., 2014). This teaching approach is useful in ensuring that teaching and learning go on as intended though the teacher may be more concerned with covering the syllabus within the stipulated time. From proceedings of focus group discussions, agriculture teachers acknowledged that in attempting to cover the syllabus, they give instructions to the students on what is to be done. According to Prince and Felder (2006), this teaching approach is dominated by knowledge delivery and the learners look upon the teacher as the sole authority who makes most of the decisions about learning. Thus, this approach to teaching is likely to curtail the development of critical thinking among the learners since all they do is to wait upon the teacher to make all the decisions about learning.

4.3.3 Demonstrator teaching approach in agriculture

There were five items used to measure the construct on the demonstrator teaching approach, items on teaching by modelling, use of personal examples, demonstrating, encouraging direct observation and hands-on teaching were provided on a Likert scale and perceptions from agriculture teachers analyzed. The results for the descriptive analysis are presented on Table 7. The respondents gave perceptions on their level of agreement by choosing one among the five responses given namely; Strongly Disagree (SD), Disagree (D), Undecided(U), Agree (A) and Strongly Agree (SA).

Table 7
Analysis of Demonstrator Teaching Approach

		Response in frequencies and percentages					
Items		SD	D	U	A	SA	Total
I model appropriate ways for	freq.	2	16	13	92	28	151
students to think about content issues	%	1.3	10.6	8.6	60.9	18.5	100
I normally show students what to do	freq.	2	18	4	86	39	151
to master the content	%	2.6	11.9	2.6	57.0	25.8	100
I use personal experiences often to	freq.	0	4	3	90	53	151
illustrate points about the content	%	0.0	2.6	2.0	59.6	35.8	100
I often show students how they can	freq.	3	12	6	104	26	151
use various principles and concepts	%	2.0	7.9	4.0	68.9	17.2	100
I give students a lot of	freq.	2	5	8	62	74	151
encouragement to do well	%	1.3	3.3	5.3	41.1	49.0	100

The analysis on demonstrator teaching approach presented on Table 7 reveals that 60.9 percent of agriculture teachers agreed and 18.5 percent strongly agreed that they model for the learners how to think about the agriculture content. As for showing learners what to do to master agriculture content, 57.0 percent of agriculture teachers agreed and 25.8 percent strongly agreed that they normally do that. The implication of this as Aldajah et al. (2014) state is that there is emphasis on direct observation and learners have role models to follow.

When responding to the statement on use of personal experiences to illustrate points, 59.6 percent of agriculture teachers were in agreement and another 35.8 percent strongly agreed which concurred with the classroom observation where 60 percent used personal examples to explain a point. Analysis display in Table 7 indicate that, 68.9 percent of agriculture teachers agreed to showing learners how various principles and concepts can be applied. Agriculture teachers seem to be giving the students a lot encouragement as indicated by 49.0 percent who strongly agreed and 41.1 percent who agreed. This is comparable to 80 percent from what was observed in class by the researcher whereby agriculture teachers gave positive feedback to the learners. Encouraging learners is likely to serve as a motivation to perform well in the subject. Vibuphol (2016) states that to maintain learning in the classroom, it is important for the teacher to motivate the learners. This author continues to say that the teaching approaches used by a teacher is considered as one of motivating factor in the learning process. It is crucial therefore for teachers to use appropriate teaching approaches that will motivate the learners to learn the subject. Teaching approaches that involve the learners actively are said to provide the extrinsic motivation to learn according to Filgona et al. (2020). The authors explain that when the learners are exposed to different learning activities, the leaning environment becomes a motivation to the learners as opposed to when they are passive as in teacher centred teaching approaches.

4.3.4 Facilitator teaching approach in agriculture

To find out the level of adoption facilitator teaching approach by agriculture teachers, five Likert Scale items were provided and perceptions of the agriculture teachers analyzed. Using the ATQ, agriculture teachers were to respond to items that would help to establish whether they usually work with students as consultants, use small group discussions, assign students projects in line with the syllabus, allow students to make choices of activities to carry out, and whether they value their interaction with students. The respondents gave perceptions on their level of agreement by choosing one among the five responses given namely; Strongly Disagree (SD), Disagree (D), Undecided(U), Agree (A) and Strongly Agree (SA). The results of the analysis are outlined on Table 8.

Table 8

Analysis of Facilitator Teaching Approach

		Response in frequencies and percentages					
Items		SD	D	U	A	SA	Total
I spend time consulting with students on	freq.	6	23	10	81	31	151
how to improve their work on projects	%	4.0	15.2	6.6	53.6	20.5	100
I use small group discussions during the	freq.	5	11	7	96	32	151
agriculture lesson to facilitate learning	%	3.3	7.3	4.6	63.6	21.2	100
I guide students' work on agriculture	freq.	4	11	3	87	46	151
projects in line with the syllabus	%	2.6	7.3	2.0	57.6	30.5	100
In my class, students can make choices	freq.	13	29	14	82	13	151
among activities in order to complete a	%	8.6	19.2	9.3	54.3	8.6	100
topic							
My interaction with the students during	freq.	4	5	5	77	60	151
the teaching/learning process is very	%	2.6	3.3	3.3	51.0	39.7	100
important							

When presented with the item requiring them to state whether they spend time consulting with students on how to improve their work on projects, analysis done and presented on Table 8 indicate that 53.6 percent agriculture teachers agree and another 20.5 percent strongly agree. On the other hand, 15.2 percent of agriculture teachers disagreed while 4.0 percent strongly disagreed with the item. The analysis therefore indicates that in total, 74.1 percent of the respondents were positive about allowing students to consult with them.

Analysis results from Table 8 indicate that 57.6 percent of agriculture teachers agreed that they guide students on project work. However, from the focus group discussions most agriculture teachers reported that they hardly give project work to their classes as a teaching approach rather whenever they talk about project work it is about the Form 4 KCSE agriculture Paper 3 which is a project. It is therefore likely that some of the agriculture teachers among the 57.6 percent were referring to the Form 4 project (Paper 3).

As to whether they use small group discussions during agriculture lesson 63.6 percent of agriculture teachers agreed and another 21.6 percent strongly agreed. Use of small groups discussions during the lesson indicates an attempt to increase learner participation in the learning process. When asked if they allow students to make choices among several activities in order to

complete a topic, 54.3 percent of agriculture teachers agreed. This implies that slightly more than half of agriculture teachers are helping the learners develop creativity and critical thinking. This was however not clearly exemplified in any of the lessons observed.

Table 8 indicates that 51.0 percent of agriculture teachers agreed and 39.7 percent strongly agreed that the teacher-student interaction during teaching is important. However, from the class observations made, class discussion in many of the classes was dominated by a few learners while the majority were silent observers. This means that as much as agriculture teachers stated that they value teacher-student interaction, it is not being illustrated as much during teaching sessions since only a few learners were interacting with the teacher.

Nilson (2018) states that one way of developing critical thinking among students is by asking questions in class that would trigger a discussion. These are questions that will require the student to describe how they arrived at their answer, and the students also need to get feedback from peers and the teacher on the correctness of their answers. From classroom observations, the researcher noted that only 20 percent of agriculture teachers asked probing questions that would require the learner to explain further the answer given. Nilson further states that the teacher's role should be that of a facilitator. A documentary by Education Scotland (2018) explains that learner participation in the learning process helps to develop important life skills like team-working, problem solving and citizenship. There is need for the agriculture teachers to involve as many learners as possible in class discussions.

Table 8 indicates that 53.6 percent of agriculture teachers agreed and 20.5 percent strongly agreed that they give time for students to consult. According to Banning (2005), teacher-learner relationships are important in the facilitator approach to teaching, especially for the learners to feel free to consult the teacher. Consultation is a practice that needs to be boosted since it improves teacher-student interaction. If facilitator teaching approach is often used, the learners may benefit by developing critical thinking, team-working, and creativity (Dismukes et al., (n.d.)).

4.3.5 Delegator teaching approach in agriculture

Five Likert scale items that relate to the delegator teaching approach were isolated from the teaching approach section of the ATQ. The respondents provided their perceptions on whether students work on projects alone, teachers develop in students the ability to work alone, students take initiative and responsibility for their own learning, there is peer teaching, and teachers assume the role of resource persons whenever the students require them. The respondents gave perceptions on their level of agreement by choosing one among the five responses given namely; Strongly

Disagree (SD), Disagree (D), Undecided(U), Agree (A) and Strongly Agree (SA). The responses to these items were analysed and the results were as indicated on Table 9.

Table 9

Analysis of Delegator Teaching Approach

Items		Response in frequencies and percentages					
		SD	D	U	A	SA	Total
Students usually work on projects alone	freq.	28	58	4	43	18	151
with little supervision from me	%	18.5	38.4	2.6	28.5	11.9	100
I make effort to develop the ability of	freq.	4	13	7	93	34	151
students to work independently	%	2.6	8.6	4.6	61.6	22.5	100
Class activities encourage students to	freq.	6	5	3	84	53	151
take initiative and responsibility for	%	4.0	3.3	2.0	55.6	35.1	100
their learning							
In my class, students take responsibility	freq.	8	27	14	77	25	151
for teaching part of the class sessions	%	5.3	17.9	9.3	51.0	16.6	100
I often assume the role of a resource	freq.	10	20	3	63	47	151
person who is available to students	%	11.9	13.2	2.0	41.7	31.1	100
whenever they need help							

The analysis displayed on Table 9, indicates that, 55.6 percent of respondents agreed and 35.1 percent strongly agreed that they make an effort to make the student take responsibility for their own learning. Taking responsibility of their own learning may be achieved through various means for instance, developing students' ability to work independently, which was agreed upon by 61.6 percent of the respondents while 22.5 percent strongly agreed. Slightly more than half (51 percent) of respondents agreed that they allow learners to teach part of the class lesson while 41.7 percent of respondents agreed and 31.1 percent strongly agreed that they assume the role of a resource person for the students whenever they need help. During the classroom observation, only 20 percent of the agriculture teachers observed allowed student to present in class their findings from an assignment given earlier on. However, 38.4 percent seem to disagree on the fact that students work alone on projects with little supervision from the teacher which complements their agreement (61.6 percent) to allowing students to develop independence in learning.

Abbas and Hussain (2018) states that, in delegator teaching approach the teacher places control of learning on the learners. The learners are free to design their own learning and the teacher's role is that of a counselor. When the agriculture teacher fails to delegate some learning

aspects to the learners, it is usually because the teacher conceives this as losing control of the teaching and learning process. Just like in facilitation, delegator teaching approach helps the learners to develop some key competencies such as communication, creativity and critical thinking which are listed as among the 21st century competencies (Joynes et al., 2019). When teachers use the teacher centred teaching approaches predominantly, acquisition of the 21st century skills cannot be effectively done. This is due to the fact that in teacher centred teaching approaches, the teacher tends transmit factual knowledge by use of lectures and text books with minimal opportunities given to learners to practice (Saavedra & Opfer, 2012).

4.3.6 Analysis of preferred teaching approaches

To analyse the teaching approaches preferred by the respondents, the score for each teaching approach was considered. The highest teaching approach score for each respondent was taken to be the preferred teaching approach and used to work out the frequencies. An analysis was then done to find out the frequency of respondents according to the highest score attained for each of the five teaching approaches. This was important in indicating which teaching approaches agriculture teachers tend to use to teach agriculture content. Table 10 shows the results of the descriptive analysis of the preferred teaching approaches for agriculture teachers.

Table 10

Preferred Teaching Approach by Agriculture Teachers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Expert teaching	17	11.3	11.5	11.5
	Formal authority	3	2.0	2.0	13.5
	Demonstrator	49	32.5	33.1	46.6
	Delegator	11	7.3	7.4	54.1
	Blended	68	45.0	45.9	100.0
	Total	148	98.0	100.0	
Missing	System	3	2.0		
Total		151	100.0		

Out of the 151 respondents, one had the facilitator teaching approach as the preferred teaching approach while for two other respondents, each had a unique blend of teaching

approaches. Thus, they were considered as outliers and were discarded from the analysis. This gives a total of 148 respondents for the preferred teaching approach analysis.

Analysis on Table 10 the indicates that that 32.5 percent of agriculture teachers had their highest score as demonstrator, followed by expert (11.3 percent), delegator (7.3 percent) and formal authority (2.0 percent). The rest of the agriculture teachers (45 percent) did not have an obvious highest score for any particular teaching approach. Thus, another teaching approach category, 'Blended', was used to describe them. This concurs to various researchers who found similar results of teachers who have a blended teaching approach (Phavadee, 2020 & Ford et al., 2016). According to Gill (2013), blended teaching approach occurs when there is an integration of the teacher' personality and interests with the learners' needs. The blended category of teaching approach is in line with several researchers who found that some teachers have no obvious high score among the several teaching approaches proposed by Grasha (2002).

From the results of the analysis done, other than the blended teaching approach, the primary teaching approaches are demonstrator (32.5 percent) and expert (11.3 percent) of respondents. These two being the predominant teaching approaches implies that the learners are provided with information, knowledge, and skills that the agriculture teacher possesses. There is also an emphasis on direct observation as the agriculture teacher demonstrates in class which provides the learners with a role model to follow (Ajdajah et al., 2014). However, one of the shortcomings of the two teaching approaches is that if the vast knowledge and skills that the teacher possesses are overused, it may intimidate the learners especially those with less experience in agriculture. There could also be a weakness if the students are not given a chance to practice after the teacher has demonstrated a practical aspect of agriculture. For more effective acquisition of skills and competencies, the teacher should take a further step of allowing the learners to practice by themselves. Audu et al. (2014) concurs with the aspect of student participation by stating that a good teaching approach should allow the learner to explore and participate in the learning process.

Failure by agriculture teachers to use facilitator teaching approach may have contributed to the inability of the secondary school graduates to apply what they learn in school into meaningful income-generating activities. Dismukes et al. (n.d.) posit that facilitator approach to teaching goes beyond imparting knowledge to the learner to being able to apply the knowledge as this leads to mastery of the required skills. Mukebo and Edwards (2016) asserts that when learner-centred teaching approaches are used, the youth are equipped with agriculture skills that enable them to engage in economic activities. Acquisition of agricultural skills through effective teaching is also supported by Waiganjo and Waweru (2018) and Muma (2016). This aspect of less use of learner-centred teaching approaches may help explain why the levels of unemployment are high among

the youth in Kenya despite the fact that 40 percent of the KCSE candidates study agriculture subject (KNEC, 2019).

4.4 Agriculture Teacher Factors and Teaching Approaches

The first objective that guided this study aimed at investigating the relationship between selected teacher factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru county. The selected teacher factors that were considered in this study are agriculture teacher's age, academic qualification, gender, and teaching experience. Teacher factors are said to have an influence on the way a teacher carries out teaching practices. Different researchers have varying opinions on the influence of teacher factors on how a teacher delivers a lesson.

4.4.1 Descriptive analysis of teacher factors

The descriptive analysis of the agriculture teacher variable was based on the agriculture teacher's responses towards items presented in the ATQ (Appendix A, Section A (2)). Frequencies and percentages were used to describe the four teacher factors considered in this study as shown in Table 11.

Table 11

Descriptive Analysis of Teacher Factors

Teacher Factor	Category	Frequency	Percentage
Age	20-30 years	56	37.1
	31-40 years	50	33.1
	>40 years	45	29.8
Gender	Male	77	51.0
	Female	74	49.0
Teaching Experience	0-5 years	59	39.1
	6-10 years	38	25.2
	>10 years	54	35.8
Highest Academic qualification	Diploma	36	23.8
	BSc/B.Ed	104	68.9
	Masters degree	11	7.3

The teachers' age was considered important in this study since it is reported that older teachers usually have a vast teaching experience and hence more effective (Zafer & Aslihan, 2012). This experience is likely to make it easier for them in choosing appropriate teaching approaches than teachers who are young. Teachers' age was in three age brackets, and the agriculture teachers chose what was appropriate according to each one's age. The age brackets were, 20-30 years, 31-40 years, and above 40 years of age. Table 11 indicates that the age group of 20-30 years had the highest proportion of agriculture teachers (37.1 percent) followed by age bracket 31-40 years (33.1 percent and above 40 years (29.8 percent). Agriculture teachers within the age bracket 20-30 years are likely to be newly qualified agriculture teachers who had completed their teacher training less than ten years before the study was undertaken.

A study done by Kyule et al. (2016) found similar proportions of agriculture teachers by age where those in the lower age bracket (20-30 years) formed the largest group. This implies that the implementation of the agriculture curriculum in secondary schools is largely in the hands of youthful teachers. The youth, though they lack experience, are the most productive in terms of service delivery (Guancheng et al., 2015). It is expected that these teachers would be very dedicated to implementing the agriculture curriculum effectively.

However, due to lack of teaching experience, mentorship of the young and inexperienced teachers by the older, more experienced agriculture teachers might be beneficial in building confidence in the new inexperienced agriculture teachers. According to Northern Territory Department of Education (2014), good mentorship is important in enhancing the quality of teaching offered by new inexperienced teachers who may experience stressful and anxious moments before becoming comfortable in teaching. Teacher mentoring as an important factor in improving teacher effectiveness is also supported by Muraya and Wairimu (2020). This is affirmed by Hudson and Hudson (2016) by stating that for beginning teachers to move from graduates to proficient stage smoothly, they often require assistance best offered as mentorship by teachers who are experienced.

From a personal communication with school heads (personal communication on 30th January 2019) during the agriculture teachers' seminar convened by the Kenya Secondary School Heads Association [KESSHA]) in Nakuru County, there is a general observation that there is a high turn-over of agriculture teachers especially those in the 20-30 years age bracket. This high turn-over of agriculture teachers could be due to several reasons; most of the trained agriculture teachers are also qualified agricultural extension officers which increases their job mobility. A possible explanation is that the fresh graduates get into teaching as an easier route of getting into the job market and then later move on to other sectors of employment outside teaching. According to

Mutune and Orodho (2014), poor pay is a major reason for teachers' high turnover especially those engaged by the school on Board of Management terms. Secondly, a number of newly qualified agriculture teachers are in most cases employed on a temporary basis by the schools' Board of Management (BOM) compared to permanent terms offered to teachers employed under Teachers Service Commission (TSC).

The tenure for teachers serving under the school's BOM usually ends once a TSC employed agriculture teacher has been posted to the school. The temporary terms of employment offered to the newly qualified agriculture teachers lack job stability, meaning that if they are not absorbed as employees of the government under TSC, the agriculture teachers will be on the lookout for job opportunities elsewhere. This state of temporary terms of employment may hinder professional growth among the young teachers since their focus is on securing a job on better terms.

The gender of the respondents in this study was one of the teacher factors considered since some studies done previously have indicated that teacher's gender may influence the teaching approach used (Akhmetova et al., 2017). Table 11 shows that there was a fairly equal representation of both male and female agriculture teachers in this study whereby out of 151 respondents, 51 percent were males and 49 percent were females.

The gender ratio in this study is comparable to data provided by UNESCO Institute for Statistics (2019) which gives the percentage of female teachers in secondary schools in Kenya as 42 percent. The comparable numbers of male and female agriculture teachers serve as a good indication to students that agriculture is a practice for both genders. This hopefully will help to negate some of the gender norms which according to Farnworth, Sundell et al. (2013) tend to limit what is appropriate for men or women to do in practicing agriculture. The presence of both male and female agriculture teachers in near equal proportions may help to change the attitude of the agriculture students concerning the stereotypes that exist in agriculture along gender lines.

Teaching experience is said to be one of the factors that distinguish effective from ineffective teachers. Teaching experience in this study was taken to mean the number of years the agriculture teacher has been teaching agriculture. Teaching experience was organized into three categories, 0-5 years, 6-10 years and above 10 years of teaching experience. Agriculture teachers were to select the category that is in line with each one's teaching experience. Table 11 presents results on agriculture teachers' teaching experience whereby the 0-5 years of teaching experience category as comprising the largest proportion of respondents at 39.1 percent, followed by 'more than 10 years' of teaching experience category 35.8 percent while the least number of respondents were in the '6-10 years' of teaching experience group, 25.2 percent. The high percentage of agriculture teachers in the '0-5 years' of teaching experience category could be because the demand for

teachers in secondary schools went up after the Kenya government's policy of Free Day Secondary Education (FDSE) in 2008 (Brudevold-Newman, 2017). This policy rapidly increased the proportion of students continuing from primary to secondary schools and thereby an increase in number of schools. These changes brought about the demand for teachers in public secondary schools. The high number of agriculture teachers in the '0-5 years' teaching experience category is in line with the finding that shows agriculture teachers who are within the '20-30 years' age group being the majority.

The demand for agriculture teachers has again been increased by the Kenya government's policy of 100 percent transition by learners from primary to secondary schools (Ministry of Education, 2019). It is therefore expected that as the Teachers' Service Commission employs more agriculture teachers to meet this demand, the number of teachers within the '0-5 years' of teaching experience category will increase. This may have implications in the teaching of agriculture in secondary schools since teachers in this category are said to be still trying out different ways of teaching before they can settle for what works and what doesn't in the teaching and learning process.

Teachers' experience is significant as those who are more experienced can use the most effective teaching approaches and leave out those methods that are tested and failed (Shah & Udgaonkar, 2018). Those highly experienced teachers have also, through challenges, been able to diversify their teaching approach according to the capability of the target class. The respondents' teaching experience was thus a point of interest in this study.

Academic qualification in this study was considered very important since it has been highly associated with the teaching approach adopted. The respondents were requested to select the highest academic qualification that applies to each one. Table 11 indicates that agriculture teachers with a BSc/ B.Ed level of education formed the largest group 68.9 percent, followed by Diploma holders 23.8 percent while only 7.3 percent agriculture teachers had a master's degree. None of the respondents in this study had a doctorate level of academic qualification.

Table 11 indicates that a high number of agriculture teachers had a BSc/ B.Ed academic qualification meaning that the teachers are well qualified to teach the subject. Having few agriculture teachers with master's degree and none with a doctorate degree teaching in secondary schools could be due to the fact that Teachers' Service Commission (TSC) lacks favourable career progression guidelines based on attainment of higher degrees (TSC, 2018). Agriculture teachers who attain high levels of academic qualifications (master's and doctorate degrees) are therefore likely to opt out of teaching within the secondary schools and move on either to teach within institutions of higher learning or to other non-teaching jobs. This could also contribute to reasons

why the number of agriculture teachers within the 'above 40 years' age bracket is the least among the three categories.

4.4.2 Testing of Hypothesis One

The first objective of this study which was to determine the relationship between selected teacher factors and teaching approaches used by agriculture teachers led to the formulation of the following null hypothesis.

Ho_1: There is no statistically significant relationship between selected teacher factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County

The *Chi*-square of independence was used to test hypothesis one with teacher factors as an independent variable and the teaching approaches (expert approach, formal approach, demonstrator approach, delegator approach and blended approach) as the dependent variable. The teacher factors that were considered in this study were agriculture teacher's age, gender, highest academic qualification and teaching experience in years. *Chi*-square test of independence was worked out separately for the various teacher factors since they cannot be combined to give one single score. The agriculture teachers' responses were placed into three categories namely; Disagree, Neutral and Agree which were used for analysis.

The respondents were asked to indicate their age within three age groups that had been set, namely, 20-30 years, 31-40 years, and above 40 years. A *Chi*-square test of independence was performed to find out if there is any relationship between agriculture teacher's age and the teaching approaches used. Table 12 displays the crosstabulation between agriculture teacher's age and preferred teaching approaches.

The crosstabulation between agriculture teacher's age and preferred teaching approaches on Table 12 indicates that for all age categories (20-30 years, 30-40 years and above 40 years) there are instances where the value of the observed and expected count diverge from each other.

Table 12

*Agriculture Teacher's Age * Preferred Teaching Approach Crosstabulation*

			Preferred teaching approach					
			Expert	Formal authority	Demonstrator	Delegator	Blended	Total
Age	20 - 30 years	Count	12_a	$0_{b, c}$	21_c	$6_{a, c}$	16_b	55
		Expected Count	6.3	1.1	18.2	4.1	25.3	55
		% within Age	21.8%	0.0%	38.2%	10.9%	29.1%	100%
	31 - 40 years	Count	3_a	0_a	14_a	3_a	29_a	49
		Expected Count	5.6	1	16.2	3.6	22.5	49
		% within Age	6.1%	0.0%	28.6%	6.1%	59.2%	100%
	Above 40 years	Count	2_a	3_b	14_a	2_a	23_a	44
		Expected Count	5.1	0.9	14.6	3.3	20.2	44
		%within Age	4.5%	6.8%	31.8%	4.5%	52.3%	100%
Total		Count	17	3	49	11	68	148
		Expected Count	17	3	49	11	68	148
		% within Age	11.5%	2.0%	33.1%	7.4%	45.9%	100%

Each subscript letter denotes a subset of Preferred teaching approach categories whose column proportions do not differ significantly from each other at the .05 level.

Based on the variations between the observed and the expected count, a *Chi*-square test of independence was used to test if there was association between the agriculture teacher's age and the teaching approaches. The test was conducted at 95% confidence interval and the results of the *Chi*-square test of independence are as shown in Table 13.

Table 13

Agriculture Teachers Age and Preferred Teaching Approaches Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	23.183[a]	8	.003	.002		
Likelihood Ratio	23.410	8	.003	.004		
Fisher's Exact Test	19.842			.005		
Linear-by-Linear Association	5.981[b]	1	.014	.014	.008	.001
N of Valid Cases	148					

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .89.

b. The standardized statistic is 2.446.

Table 13 displays the results of the *Chi*-square test of independence. Since more than 20 percent of the cells had a count less than five, Fisher's Exact Test is referred. Thus, there is significant relationship $\chi 2$ (8, N=148) = 19.84, p = .005 between agriculture teachers' age and teaching approaches since the fisher's p value is .005.

The significant relationship between teachers' age and teaching approaches was further probed to establish its strength. Cramer's *V* test was done and the results are as presented in Table 14. Table 14 displays the effect size for this finding, Cramer's *V,* was .28 which indicates a very strong relationship (Akoglu, 2018) between agriculture teachers' age and teaching approaches.

Table 14

Teaching Approach and Teacher's Age Cramer's V test

Symmetric Measures

		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.396	.003	.002
	Cramer's *V*	.280	.003	.002
N of Valid Cases		148		

The significant relationship between teachers' age and teaching approaches is supported by researchers like Kimani et al. (2013) and Ismail et al. (2018). However, there are conflicting views from various researchers about teacher's age and teaching approaches used. For instance, Shah and Udgaonkar (2018) found that there is no association between teacher's age and teaching

approaches use. Adiembo and Simatwa (2014) suggest that there is need to investigate this relationship further. According to Shah and Udgaonkar (2018), it is generally thought that as age advances, teachers lose the enthusiasm to teach probably due to the boredom of teaching the same content over several years. Yet, some have a different view that age and experience go hand in hand meaning that as teachers advance in age, the more effective they get (Hanushek, 2014).

The respondents were asked to state their gender (Male or Female) and their responses were used for analysing the relationship between teachers' gender and teaching approach. Table 15 shows the crosstabulation of agriculture teachers' gender and teaching approaches.

Table 15

*Agriculture Teachers' Gender * Preferred Teaching Approach Crosstabulation*

			Preferred teaching approach					
			Expert teaching	Formal authority	Demonstrator	Delegator	Blended	Total
Gender	Male	Count	11_a	1_a	21_a	7_a	35_a	75
		Expected Count	8.6	1.5	24.8	5.6	34.5	75
		% within Gender	14.7%	1.3%	28.0%	9.3%	46.7%	100%
	Female	Count	6_a	2_a	28_a	4_a	33_a	73
		Expected Count	8.4	1.5	24.2	5.4	33.5	73
		% within Gender	8.2%	2.7%	38.4%	5.5%	45.2%	100%
Total		Count	17	3	49	11	68	148
		Expected Count	17	3	49	11	68	148
		% within Gender	11.5%	2.0%	33.1%	7.4%	45.9%	100%

Table 15 indicates that the majority (45.9 percent) of the teachers had adopted a blended teaching approach with the males' adoption of this teaching approach being slightly higher (46.7 percent) compared to the females (45.2 percent). The demonstrator approach was more dominated

by the females (38.4 percent) compared to the 28.0 percent of the male teachers. Expert approach was adopted more by the male teachers (14.7 percent) while the female teachers using this approach were only 8.2 percent. There was an observed variation of proportion of female and male agriculture teachers adopting formal authority and delegator approaches as 1.3 percent of the males adopted formal authority compared to 2.7 percent of the females while 9.3 percent male had adopted delegator approach as compared to 5.5 percent of the female agriculture teachers. The analysis shows slight differences between the observed and expected count across the teaching approaches.

Based on the variations between observed and expected count, a *Chi*-square test of independence was performed to find out if there was a relationship between gender and the teaching approaches. The test was conducted at 95 percent confidence interval. The *Chi*-square test of independence revealed that at 5 percent level of precision, teaching approaches adopted by agriculture teachers was not dependent on the gender of the teachers. The p value of the test was .455, which is greater than .05 hence there is no significant relationship between agriculture teachers' gender and teaching approaches as presented in Table 16.

Table 16

Agriculture Teachers' Gender and Preferred Teaching Approaches Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.655[a]	4	0.455
Likelihood Ratio	3.696	4	0.449
Linear-by-Linear Association	0	1	0.984
N of Valid Cases	148		

a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.48.

The results of the *Chi*-square test of independence, $\chi 2$ (4, N=148) = 3.655, p = .455, displayed on Table 16 gives a p-value (.455) greater than the significant level of .05. The results indicate that the relationship between agriculture teacher's gender and preferred teaching approach is not significant.

The finding of non-significant association between teacher's gender and teaching approaches in this study is supported by similar studies. Dash and Barman (2016) and Onyekuru and Ibegbunam (2013) conducted separate studies that sought to find out the differences in male and female teachers' teaching effectiveness. Both studies found that there was no statistically significant difference between male and female teachers regarding teaching effectiveness. In their

study on teacher effectiveness, Roy and Halder (2018), found that there are no differences in teaching approaches used among male and female teachers.

The agriculture teachers were asked to state their teaching experience in years by selecting one of the three teaching experience categories offered. Data collected showed that among the three categories of teaching experience, '0-5 years', '6-10 years' and 'above ten years', the responses were 39.07 percent, 25.17 percent, and 35.76 percent respectively. Teaching experience in this study was placed in the three categories based on findings from various studies done on teaching effectiveness and teaching experience (Ismail et al., 2018; Sadik & Akbulut, 2015). A *Chi*-square test of independence was performed to find out if there is any relationship between agriculture teacher's teaching experience and the teaching approaches used. The results of teaching experience and teaching approach crosstabulation analysis are shown on Table 17.

Table 17

*Teaching Experience * Preferred Teaching Approach Crosstabulation*

			Preferred Teaching Approach					
			Expert	Formal authority	Demonstrator	Delegator	Blended	Total
Teaching experience	0 - 5 years	Count	11_{a}	$0_{b, c}$	$24_{a, c}$	$7_{a, c}$	17_{b}	59
		Expected Count	6.8	1.2	19.5	4.4	27.1	59
		% within Teaching experience	18.6%	0.0%	40.7%	11.9%	28.8%	100%
	6 - 10 years	Count	3_{a}	1_{a}	10_{a}	2_{a}	21_{a}	37
		Expected Count	4.3	0.8	12.3	2.8	17	37
		% within Teaching experience	8.1%	2.7%	27.0%	5.4%	56.8%	100%
	Above 10 years	Count	3_{a}	$2_{a, b}$	$15_{a, b}$	$2_{a, b}$	30_{b}	52
		Expected Count	6	1.1	17.2	3.9	23.9	52
		% within Teaching experience	5.8%	3.8%	28.8%	3.8%	57.7%	100%
Total		Count	17	3	49	11	68	148
		Expected Count	17	3	49	11	68	148
		% within Teaching experience	11.5%	2.0%	33.1%	7.4%	45.9%	100%

Each subscript letter denotes a subset of Preferred teaching approach categories whose column proportions do not differ significantly from each other at the .05 level.

The aim being to establish the relationship between teacher factors and the teaching approaches adopted by agriculture teacher in secondary schools in Nakuru county. Table 17 indicates that majority of agriculture teachers (45.9 percent) had adopted blended teaching approach which was more dominated by agriculture teachers with more than 10 years experience (57.7 percent) followed by those with 6-10 years of experience (56.8 percent) and those with five years less of teaching experience were 28.8 percent. This may be attributed to the fact that teaching experience allows a teacher to discover what works and what teaching approach one is comfortable with.

Different trends were found among the other teaching approaches whereby 40.7 percent of the 0-5 years of experience category had adopted the demonstrator teaching approach compared to 28.8 percent of the > 10 years experience category and 27.0 percent of the 6-10 years of experience category.

It was found that 11.5 percent of the agriculture teachers had adopted expert teaching approach. This approach was more adopted by agriculture teachers with five or less years of experience (18.6 percent) while among agriculture teachers with 6-10 years of experience, only 8.1 percent and 5.8 percent for >10 years of experience had adopted the expert teaching approach.

Based of the variations between observed and expected count presented in Table 17, *Chi*-square test of independence was carried out between teaching experience and teaching approaches. The test was conducted at 95 percent confidence interval. Table 18 visualizes the results of the *Chi*-square test of independence between teaching experience and teaching approaches.

Table 18

Teaching Experience and Preferred Teaching Approaches Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	17.262[a]	8	.027	.022		
Likelihood Ratio	18.570	8	.017	.025		
Fisher's Exact Test	16.779			.018		
Linear-by-Linear Association	7.378[b]	1	.007	.007	.003	.001
N of Valid Cases	148					

a. 7 cells (46.7%) have expected count less than 5. The minimum expected count is .75.

b. The standardized statistic is 2.716.

Since more than 20 percent of the cells have expected count less than 5, the Fisher's Exact Test is referred. The *Chi*-square test of independence was performed to investigate the relationship between teaching experience and teaching approaches reveals that the relationship is significant, $\chi 2$ (8, N=148) = 16.78, p = .018. The *Chi*-square test of independence results in Table 18 reveals that at 5 percent level of precision, teaching approach adopted by agriculture teachers was dependent on the teaching experience of the teachers. Agriculture teachers with >10 years of teaching experience are more likely to use blended and formal authority teaching approaches more than other teachers while those with five or less years of teaching experience are more likely to use expert and demonstrator teaching approaches.

The p value of the test was .018, which is less than .05 hence there is a significant relationship between teaching experience and teaching approaches. The significance of this relationship was further probed to find out its strength and the Cramer's *V* test results are presented on Table 19.

Table 19

Teaching Approach and Teacher's Teaching Experience Cramer's V test

		Symmetric Measures		
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.342	.027	.022
	Cramer's V	.241	.027	.022
N of Valid Cases		148		

Table 19 displays the effect size for this finding, Cramer's *V,* was .24. This indicates a strong relationship (Akoglu, 2018) between agriculture teachers' teaching experience and teaching approaches used.

Tyagi (2013) indicates that teaching experience creates enthusiasm, meaning that teachers are likely to be more effective as they gain experience. Some studies have indicated that the newly employed teachers may have challenges settling down into a new job and trying out to see what works best as far as teaching practices are concerned. Onyekuru and Ibegbunam (2013) reveal that teachers with more than five years of teaching experience are more effective in teaching than teachers with less than five years of teaching experience. However, as much as inexperienced teachers are less effective than experienced teachers, the benefits of teaching experience diminish after a few years of teaching (Kimani et al., 2013; Mazumder & Ahmed, 2014). Thus, there seems to be conflicting conclusions from different authors concerning relationship between teaching experience and teaching effectiveness.

The agriculture teachers were asked to indicate their highest academic qualifications. A *Chi*-square test of independence was performed to find out if there is any relationship between agriculture teacher's academic qualification and the teaching approaches used. Table 20 shows the crosstabulation between agriculture teachers' highest academic qualification and preferred teaching approaches.

The crosstabulation between highest academic qualification and preferred teaching approach on Table 20 indicates that BSc/B.Ed holders lead in adoption of blended teaching approach (47.1 percent) followed by diploma (44.4 percent) and Masters (40.0 percent) respectively. Adoption of demonstrator teaching approach was dominated by Masters degree holders (50.0 percent) followed by diploma teachers (44.4 percent) and then BSc/B.Ed holders (27.5 percent). The adoption of the other teaching approaches was low among all the academic qualification levels with BSc/B.Ed holders leading in adoption of both expert (14.7 percent) and delegator (8.8 percent) teaching approaches.

Table 20

*Highest Academic Qualification*Preferred Teaching Approach Crosstab*

			Preferred teaching approach					
			Expert teaching	Formal authority	Demonstrator	Delegator	Blended	Total
Highest education level	Diploma	Count	2_{a}	0_{a}	16_{a}	2_{a}	16_{a}	36
		Expected Count	4.1	0.7	11.9	2.7	16.5	36
		% within Highest education level	5.6%	0.0%	44.4%	5.6%	44.4%	100.0%
	BSc or BEd	Count	15_{a}	$2_{a, b}$	28_{b}	$9_{a, b}$	$48_{a, b}$	102
		Expected Count	11.7	2.1	33.8	7.6	46.9	102
		% within Highest education level	14.7%	2.0%	27.5%	8.8%	47.1%	100.0%
	Masters	Count	0_{a}	1_{b}	$5_{a, b}$	0_{a}	$4_{a, b}$	10
		Expected Count	1.1	0.2	3.3	0.7	4.6	10
		% within Highest education level	0.0%	10.0%	50.0%	0.0%	40.0%	100.0%
Total		Count	17	3	49	11	68	148
		Expected Count	17	3	49	11	68	148
		% within Highest education level	11.5%	2.0%	33.1%	7.4%	45.9%	100.0%

Each subscript letter denotes a subset of Preferred teaching approach categories whose column proportions do not differ significantly from each other at the .05 level.

Based on the variations between expected and observed count, *Chi*-square test of independence was used to test if there was association between highest academic qualification and the teaching approaches. The test was conducted at 95 percent confidence interval. The results of the *Chi*-square test of independence are as shown in Table 21.

Table 21

Highest Academic Qualification and Preferred Teaching Approaches Chi-Square Tests

	Value	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	11.586[a]	.171	.162		
Likelihood Ratio	12.668	.124	.144		
Fisher's Exact Test	9.400		.245		
Linear-by-Linear Association	.105[b]	.746	.766	.390	.032
N of Valid Cases	148				

a. 9 cells (60.0%) have expected count less than 5. The minimum expected count is .20.

b. The standardized statistic is -.325.

Table 21 indicates that >20 percent of cells had expected count less than 5 hence using the Fisher's Exact Test, $\chi 2$ (8, N=148) = 9.40, p = .25. The *Chi*-square test of independence reveals that at 5 percent level of precision, teaching approaches adopted were not dependent on the agriculture teachers' highest academic qualification. The p value of the test was .25, which is greater than .05 hence there is no relationship between agriculture teachers' highest academic qualification and teaching approaches.

Similar results were arrived at by Mazumder and Ahmed (2014) where they found that teacher's academic qualification does not influence the teaching approaches used. A report given by Adu and Ade-Ajayi (2015) concerning studies done by several researchers on the relationship between teacher qualifications and students' performance show contradicting results. For instance, Ayodele (2005) as quoted in Adu and Ade-Ajayi (2015) declares that 'students' achievement is lower in classes where the teacher possesses an advanced degree'. In the same report, Olutola (1986) asserts that there is a positive relationship between teachers' qualifications and students' performance. In his report on 'Boosting teacher effectiveness' Hanushek (2014) declares that teacher academic qualifications are not closely related to how a teacher teaches, an opinion that is also supported by Dash and Barman (2016).

When tested individually, the teacher factors are seen to have varied association with the teaching approaches where teachers' age and teaching experience showed a significant relationship with teaching approaches. Teachers' gender and highest academic qualification had a non-significant relationship with teaching approaches. To get the significance of agriculture teacher

factors and teaching approaches, multinomial logistic regression was used. The first step was to find the model fitting information (Table 22) which shows that there is a significant improvement in the fit of the final model compared to the null model [$\chi 2$ (28) = 45.96, p = .018].

Table 22

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	182.715			
Final	136.756	45.960	28	.018

A p value of .018 means that the full model shows statistically significant association of the teacher factors and teaching approaches better than the intercept-only model alone. A goodness of fit analysis follows, as shown in Table 23, which indicates that the Pearson *Chi*-square test [$\chi 2$ (100) = 83.02, p = .89] giving a p value greater than .05. A statistically significant result, that is, $p < .05$, indicates that the model does not fit the data well. Therefore, the non-significant results (p=.89) indicates that the model fits the data well.

Table 23

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	83.022	100	.890
Deviance	70.858	100	.988

Table 24 displays the likelihood ratio *Chi*-square test to indicate whether there is a significant improvement in the fit of the final model compared to the intercept only (null) model. The results of the Likelihood Ratio Tests are to indicate which of the independent variables are statistically significantly related to teaching approaches. From the p values, none of the attributes of teacher factors show a significant relationship with teaching approaches.

Table 24

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	136.756[a]	.000	0	.
Gender	139.442	2.686	4	.612
Age	149.449	12.693	8	.123
Highest Education Level	148.213	11.457	8	.177
Teaching Experience	142.787	6.031	8	.644

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

a. This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Since the analysis in Table 24 indicates that none of the teacher factors shows statistically significant association with teaching approaches, then hypothesis one (Ho_1) stating that there is no statistically significant relationship between teacher factors and teaching approaches is accepted. This implies that the adoption of teaching approaches is not dependent on combined effect of the teacher factors.

4.5 Curriculum Factors and Teaching Approaches

The four curriculum factors selected for this study comprised of agriculture teachers' teaching workload, agriculture syllabus, agriculture subject assessment mode and professional development activities for agriculture teachers. Section C of the ATQ had nine items that the agriculture subject teachers were asked to respond to. The items on curriculum factors were on a Likert Scale which allowed teachers to respond to how much they agree or disagree with the point of view presented.

4.5.1 Descriptive analysis of curriculum factors

Four curriculum factors that were the focus of this study are teaching workload, syllabus, mode of assessment for agriculture and PDA. Their descriptive analyses are presented in this section.

The teaching workload were organized into three categories namely; less than 18 lessons per week, 18-27 and above 27 lessons per week. The agriculture teachers were requested to indicate the workload category that best describes each one's teaching workload. The teaching workload was in terms of number of lessons indicated in the official school timetable. Figure 8 presents the results of agriculture teachers' workload.

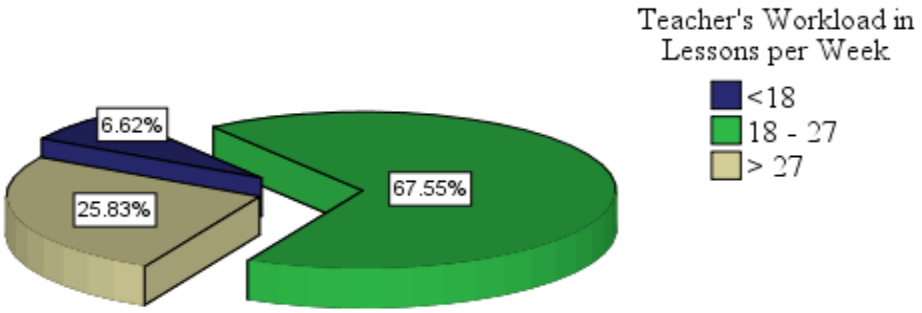

Figure 8: Agriculture Teachers' Teaching Workload

Figure 8 indicates that most agriculture teachers, 67.55 percent, had a teaching workload of 18-27 lessons per week. However, a substantial portion of the agriculture teachers, 25.83 percent in the study had a teaching workload of more than 27 lessons per week. Only a few agriculture teachers, 6.62 percent had a teaching workload of less than 18 lessons per week. Those teachers with few lessons per week most likely have other school administrative responsibilities which requires them to have a reduced teaching workload. Due to the high demand for agriculture teachers in secondary schools, the teachers are therefore likely to have a high teaching workload. The high demand for agriculture teacher is evident from a request made by TSC to Kenyan universities to train more teachers in understaffed subjects and agriculture was among the subjects listed (News Blaze Digital team, 2018). Agriculture being one of the understaffed subjects makes it among the five most marketable subjects in secondary school curriculum (Nyamwembe, 2018).

According to Sichambo et al. (2012) the recommendation by TSC is that secondary school teachers should have a maximum of 27 lessons per week (18 hours) as their teaching workload for a teacher to be effective in his or her work. However, a 'Report of the Taskforce on Secondary School Fees 2014' indicates that there is a recommendation being mooted to have teachers teach 22 hours per week which translates to 32 lessons per week (Oduor, 2014). This workload is supported by TSC in their circular stating that secondary school teachers should teach a minimum of 27 lessons per week (TSC, 2020). Though TSC is silent on the maximum teaching load that a teacher should have. Oduor (2012) reports a proposal by TSC to have every teacher teach an extra

lesson everyday. An extra lesson per day in addition to the minimum requirement of 27 lessons per week, gives a proposed minimum teaching load of 32 lessons per week. In the focus group discussions, the agriculture teachers expressed lack of information concerning the expected teaching workload though they stated that 32 lessons per week would be a high workload. The proposed workload, as the teachers expressed, does not consider that agriculture teachers need preparation time for the lessons and also time for student assessment. They also expressed that there is no consideration that time required for lesson preparation is different for different subjects.

In the focus group discussions, the participants decried the high teaching workload for agriculture teachers which sometimes is due to shortage of staff as some were the only agriculture teacher in the entire school. This leaves the agriculture teacher exhausted and with little time to plan and prepare for agriculture lessons and engage in assessment activities for the large classes. Due to a shortage of agriculture teachers, the discussions revealed that some schools combine different streams to be taught together in order to reduce the teaching workload. Combining different streams to be taught together solves one problem but creates another; large class sizes. The focus group discussions revealed that in most public secondary schools the agriculture teachers give extra lessons to their classes. This means that the agriculture teachers' teaching workload is in most cases higher than what is indicated in the school's official timetable. Teaching of extra lessons by the teachers is confirmed by Sichambo et al. (2012) in their study among secondary school teachers in Bungoma County, Kenya.

An interesting aspect about lesson arrangement in the timetable arose from the focus group discussions. The double lessons have been split into separate single lessons in the timetable, meaning that the agriculture teacher has only single lessons in which to conduct teaching. This has far reaching implications as far as choice of teaching approaches to use is concerned. Without double lessons, the agriculture teacher would be limited in the number and kind of demonstrations and practical work that can be offered to the class. Timetabling for single lessons only may be driving the agriculture teachers to use more of teacher-centred teaching approaches.

Concerning lesson preparation, the agriculture teachers cited the case of science teachers who have the support of the laboratory technicians who help them to acquire teaching materials and organize the laboratory for teaching. No such support is given to the agriculture teachers who also need to organize for practical work and demonstrations just like the science teachers do. This means that the agriculture teachers, as much as they have a high workload, have to source for teaching materials, organize or prepare the materials for teaching which takes a substantial time to accomplish. This may have led to limited use of teaching resources that the students can manipulate in class. It was noted during classroom observation that none of the agriculture teachers gave

materials to the students to manipulate during the lesson. This implies that agriculture teachers are likely to use teaching approaches that emphasise more on cognitive and not psychomotor skills.

The respondents were asked to indicate whether their teaching workload allows them to have adequate time for lesson preparation. Availability of preparation time is key in determining the learning activities and instructional resources that the agriculture teacher can plan and prepare for. Agriculture teachers may shun learning activities that require a lot of time to prepare for in terms of sourcing, collecting or constructing the instructional materials. In their study, Raluman and Avan (2016) found out that there is a strong relationship between teaching workload and teaching effectiveness. From the focus group discussions, it emerged that lack of enough preparation time, often leads to use of teaching approaches that are teacher centred. The teachers confessed that they knew about the learner centred teaching approaches but it is difficult to use them due to pressure to cover the syllabus. The descriptive analysis of agriculture teachers' response to the item on workload is displayed on Figure 9.

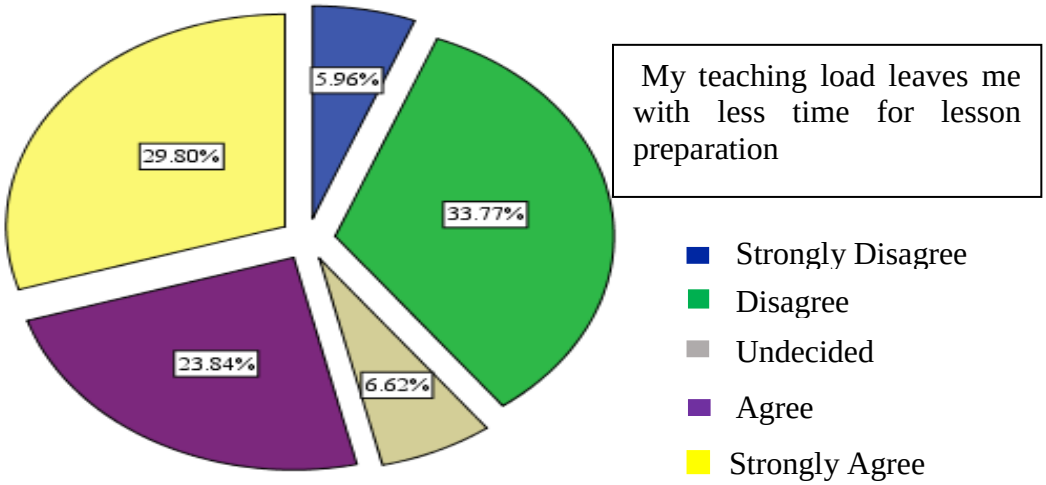

Figure 9: Teaching Load and Adequacy of Lesson Preparation Time

The responses given indicates that the highest percentage (33.77 percent) is of agriculture teachers who disagreed with the statement. Adding together the proportion of agriculture teachers who strongly disagreed (5.96 percent) gives a total of 39.73 percent. This is the percentage of agriculture teachers whose teaching load does not deny them adequate time for lesson preparation. However, from the analysis, 23.84 percent of the agriculture teachers agreed and another 29.80 percent strongly agreed with the statement. This means that majority of agriculture teachers (53.64 percent) were having a teaching load that leaves them with inadequate time for lesson preparation.

The implication of teaching workload not allowing agriculture teachers adequate lesson preparation time is likely to impact on adoption of teaching approaches. Agriculture teachers are likely to go for the teaching approaches that require minimal preparation time. Such teaching approaches would mainly be the teacher-centred where learner participation is minimal. This concurs with the class observation done in this study where the researcher found that 80 percent of the agriculture teachers predominantly used lecture and discussion methods. Lack of double lessons on the timetable seems to further discourage the agriculture teachers from conducting practical work, demonstrations, and projects. The participants lamented that if only they could have 'farm assistants' similar to the laboratory assistants that science teachers do have, their work would be easier and they would be able to give more demonstrations and practical work. This is important, as reported in the focus group discussions, in consideration to the rapid increase of number of students in class due to the implementation of education policies like Free Primary Education (FPE), FDSE and 100 percent primary to secondary school transition.

As reported by Cheplogoi (2014), high teaching workload negatively affects curriculum implementation. Thus, it is necessary to employ more agriculture teachers to ensure that the teaching workload is maintained at manageable levels. Sichambo et al. (2012) posits that high teaching workload may lead to exhaustion which may lead to poor student performance when the teachers use teaching approaches that are easy to prepare for and not what is necessarily most appropriate to use. This may be one of the factors contributing to the poor performance of agriculture students in the national examinations (KCSE).

The participants gave their perceptions on various aspects about the agriculture syllabus. The agriculture teachers were asked to respond to two items that required them to indicate whether the time allocated to teach the syllabus was enough or not. The responses to choose from were Strongly Disagree (SD), Disagree (D), Undecided (U), Agree (A), and Strongly Agree (SA). The percentages of the various responses by agriculture teachers were as indicated on Table 25.

Table 25

Syllabus versus Time Allocated for Teaching

Item		Response in frequencies and percentages					
		SD	D	U	A	SA	Total
Time allocated to cover the agriculture syllabus is enough	Freq.	32	49	10	44	16	151
	%	21.2	32.5	6.6	29.1	10.6	100
There is limited time allocated to cover the syllabus	Freq.	26	42	5	49	29	151
	%	17.2	27.8	3.3	32.5	19.2	100

When asked whether time allocated for syllabus coverage was enough, Table 22 indicates that agriculture teachers who disagreed had the highest percentage (32.5 percent). The total percentage of those who strongly disagreed (21.2 percent) and those who disagreed (32.5 percent) was 53.7 percent. Thus, more than half of the agriculture teachers were of the opinion that time allocated for syllabus coverage is not enough. The percentage of the agriculture teachers who strongly agreed (10.6 percent) and those who agreed (29.1 percent) that time allocated for syllabus coverage is enough gives a total of 39.7 percent. The agriculture teachers who seem to agree that time allocated for syllabus coverage is enough are probably those who have settled for the use of teaching approaches which enable the teacher to cover the syllabus quickly. Such teaching approaches are likely to be teacher centred. The teacher centred teaching approaches allow the teacher to cover a lot of agriculture syllabus content within a short period of time.

Further analysis was done to find out whether there is any difference in the teaching approaches of agriculture teachers who agreed and those who disagreed that time allocated to cover the syllabus is enough. Table 26 displays the results of the analysis.

Table 26

Teaching Approaches versus Syllabus Coverage

		Response in percentages				
	Variable	SD	D	U	A	SA
Time allocated to cover the syllabus is enough	Expert	31.3	32.7	30.0	22.7	12.4
	Formal authority	6.3	2.0	0.0	4.5	18.8
	Demonstrator	50.0	40.8	70.0	54.5	31.3
	Facilitator	9.4	12.2	0.0	15.9	18.8
	Delegator	3.1	12.2	0.0	2.3	18.8
	Total	100.1	99.9	100.0	99.9	100.1

Table 26 indicates that for both groups, those who agreed and those who disagreed, demonstrator was their preferred teaching approach. The lack of difference in teaching approach preference could be attributed to level of learner involvement. Demonstrator teaching approach marks the point where the teacher is transiting from teacher-centred to learner-centred teaching approaches. According to Gill (2013), the demonstrator approach is like the formal authority teaching approach except that the teacher has opportunities to include multimedia presentations, activities and demonstrations. The extent to which the agriculture teacher increases learner involvement through various learning activities may determine how much time a teacher takes to cover the same content. Thus, this could have led to a difference in opinion among agriculture teachers when responding to adequacy of time allocated to cover the syllabus.

In contrast to the analysis of the two items in the ATQ on syllabus and time allocation, majority of the focus groups participants expressed their frustration in teaching the wide syllabus within the inadequate time allocated. Most agriculture teachers admitted having to create extra time to teach the agriculture students in order for them to cover the syllabus adequately and even then, they minimize the practical work and demonstrations given. This practice by the agriculture teachers of organizing for extra lessons implies that time allocated to cover the syllabus is not adequate. The extra lessons not only increase the teaching load but also reduce agriculture teacher's time for lesson preparation and student assessment.

During the discussions, some participants expressed that they feel under pressure to comply with expectations from the head of department or the school head, who constantly check on level of syllabus coverage. The school administration seems to be interested in 'syllabus coverage' and not in 'how' the agriculture content was taught. To comply with these expectations, the agriculture teachers resort to using teaching approaches that are not very appropriate in teaching the subject. This was also noted during the classroom observation whereby most of the agriculture teachers observed in class used lecturing with some interjection of question-and-answer sessions.

The agriculture teachers attested to the fact that they avoid using practical work as a teaching and learning activity because it takes time to prepare and conduct in class and at best, they use limited demonstrations in class. When asked about the type of demonstrations they use in class, most teachers reported that they mainly use teacher demonstrations where the learners are only required to observe and record their observations. These demonstrations as much as they are a better approach to teaching than lecturing, the learners may not acquire the competencies they are expected to get from observations only without trying out the practices by themselves. It appears therefore that the focus of the agriculture teachers is to cover the syllabus instead of teaching to make students understand and acquire skills from the agriculture content being taught.

The dissonance between agriculture content to be taught and time allocated may result in the agriculture teachers using teaching approaches that are not appropriate for teaching the subject. This is supported by a report made by INTO (2007) which states that curriculum overload can be a challenge to teachers who may resort to teaching approaches that will enable them to complete the syllabus on time. These methods are usually the teacher-centred methods which have been said to result into surface learning often associated with memorization and reproducing the learning material (Lindblom-Ylanne et al., 2019).

As for the poor performance of students in the agriculture national examination, participants in the focus group discussions raised a number of possible reasons to explain why. Poor students' attitude towards the subject was top most given the fact that students who are not slotted to study

other technical subjects are pushed to study agriculture subject. The agriculture teachers expressed that students see other technical subjects, for example, computer studies, home science, art and design, technical drawing, aviation, woodwork as more prestigious than agriculture. From the focus group discussions, the agriculture teachers claimed that agriculture students have a perception that there are no lucrative careers in agriculture and therefore there is no need to work hard in the subject. In addition, those students who would work hard in agriculture subject would do so with a view that the subject is to boost their overall mean grade. Besides, students see agriculture as manual and dirty work because of having to handle soil with their hands.

The respondents gave their opinions concerning the assessment of KCSE agriculture. Table 27 gives the analysis of the responses on the items dealing with KCSE examination mode for agriculture.

Table 27

Agriculture Subject Assessment and Teaching Approaches

Item		Response in frequencies and percentages					
		SD	D	U	A	SA	Total
The students get enough knowledge to pass agriculture national examination (KCSE)	Freq.	13	33	10	69	26	151
	%	8.6	21.9	6.6	45.7	17.2	100
KCSE does not examine practical skills directly	Freq.	17	32	11	58	33	151
	%	11.3	21.2	7.3	38.4	21.9	100

Results of the analysis displayed on Table 27 shows that, 45.7 percent of the respondents agreed that the students get enough knowledge to pass KCSE examination in agriculture. Adding the proportion of agriculture teachers who agreed to those who strongly agreed 17.2 percent gives a proportion of 62.9 percent of agriculture teachers who are of the opinion that students get enough agriculture content knowledge to make them pass the national examinations. This implies that the agriculture teachers are satisfied with the knowledge they pass on to the learners yet the results for the national agriculture examination are poor. It is highly suspected, therefore, that the teaching approaches they use do not make the learners comprehend the agriculture content. Table 27 indicates that 38.4 percent of respondents agreed and another 21.9 percent strongly agreed that practical skills are not examined directly in the KCSE examination giving a total of 60.3 percent of agriculture teachers whose opinion is positive about the item.

The examination mode itself may have an impact on the teaching approaches used by agriculture teachers. From Table 24, agriculture teachers seem to agree that KCSE agriculture does

not examine practical skills directly. Also, the focus group discussions revealed that the agriculture teachers do not put emphasis on teaching agricultural skills because there is no practical examination set for the students. Hoque (2016) posits that where an education system tends to gauge teacher and school effectiveness by analysing students' academic performance, teachers tend to teach or drill students to pass examinations. It is unfortunate that the teachers do not see a connection between their teaching and equipping the students for future, instead they focus on passing of examinations. In the focus group discussions, the agriculture teachers lamented that the project (Paper 3) takes a lot of time and effort to complete but only accounts for 20 percent of the entire marks awarded for the subject. Though the project assesses practical skills, the agriculture teachers feel that it is too much effort for too little which tends to discourage both the teacher and the student. The agriculture teachers compared agriculture and science subjects whereby the practical paper in sciences contributes to 40 percent of the overall mark a student gets. Students sit for science practical papers for a duration of 2 to 3 hours, yet the agriculture project that takes several months to complete only contributes 20 percent to the student's overall mark.

The phasing out of the agriculture practical paper, as claimed in the focus group discussions by the agriculture teachers who have taught for many years, has affected the teaching approach used, with many not emphasising the teaching of skills (practical work and demonstrations) because after all, "practical skills will not be tested directly". With the abolition of practical examinations came the reduction of number of agriculture lessons per week which greatly affected the coverage of the syllabus and more recently the splitting of the double agriculture lessons which directly impacts negatively on practical work and demonstrations offered to students in class.

The participants also claimed that the examination marking regime is unfair; half a mark for every point as opposed to a full mark awarded in other subjects. According to the respondents, this tends to discourage the students who have to give many points in agriculture for them to score high marks. This situation of not giving emphasis to skill acquisition is likely to have a turn-around with the implementation of the competence-based education since it emphasises on the acquisition of competencies (Republic of Kenya, 2017).

Atandi et al. (2019) posit that when teacher centred approaches are used, the teachers tend to test the students on the concepts taught by giving examination questions related to the teacher's presentation. This trend tends to encourage cramming and not the understanding of the concepts. There is need to establish if this is how the agriculture teachers set the internal examinations because if so, then the agriculture students may not be adequately prepared to answer questions that address the higher order thinking like application. How agriculture teachers teach and examine the students may help shed light on the poor performance of agriculture students in KCSE.

The participants gave their views about seminars and workshops organized for agriculture teachers. Workshops and seminars are mainly what the teachers identify as constituting professional development activities (PDA). Participants in all the focus groups were in agreement that PDA are important since they would get a chance to speak out concerning challenges they face in teaching agriculture. PDA would also allow them to share with experts and peers on how to deal with the challenges and ultimately their teaching effectiveness would be improved. They expressed that the PDA would help them to refresh on some of the practical skills they learned while training as teachers, an activity that could boost their confidence as they demonstrate before their students. PDA would also help them 'catch-up' with innovations in agriculture which would boost their agricultural knowledge and skills.

Some expressed that they had never attended PDA organized for agriculture teachers, others had attended a few years before the time of the focus group discussion, while a few had attended at least one PDA in the previous one year. Most felt that the few PDA organized for agriculture teachers were more reactionary to issues arising within the teaching of agriculture. Some of the instances when the agriculture teachers were called for a meeting was to address poor performance in agriculture subject's national examination (KCSE) or change in education policy. For instance, on 30th January, 2019, the researcher attended one such forum for agriculture teachers where they were being informed by KNEC personnel on changes in the assessment of the Form 4 agriculture project. This forum was for passing policy issues to the agriculture teachers but not to deal with challenges that they could be facing in implementing the curriculum. The agriculture teachers who participated in the focus group discussions expressed the need for continuous curriculum support through PDA and that in such fora, real issues about teaching of agriculture should be addressed.

There were four items that required the agriculture teachers to give their response as to how much they agreed or disagreed with the items related to PDA. The descriptive analysis expressed as percentages for each of the response are shown on Table 28.

Table 28

Curriculum PDA and Teaching Approaches

Item		Response in frequencies and percentages					
		SD	D	U	A	SA	Total
I have had exposure to new teaching approaches through seminars organized for agriculture teachers	Freq.	15	38	9	71	18	151
	%	9.9	25.2	6.0	47.0	11.9	100
I attend workshops/seminars organized for agriculture teachers regularly	Freq.	28	51	7	55	10	151
	%	18.5	33.8	4.6	36.4	6.6	100
I have inadequate information due to limited in-service training for agriculture teachers	Freq.	30	58	10	35	18	151
	%	19.9	38.4	6.6	23.2	11.9	100
I have attended at least one workshop/seminar on technical help in teaching agriculture the last twelve months	Freq.	27	34	3	58	29	151
	%	17.9	22.5	2.0	38.4	19.2	100

Table 28 displays the results of the analysis which indicate that 47 percent of the respondents agreed and 11.9 percent strongly agreed that they have had exposure to new ways of teaching through seminars organized for agriculture teachers. This implies that 58.9 percent of agriculture teachers have been exposed to new teaching approaches through PDA. Only 25.2 percent disagreed and another 9.9 percent who strongly disagreed with the statement. It seems that majority of agriculture teachers have been exposed to new ways of teaching despite the fact that research indicates that lecturing is a common approach to heir agriculture content delivery.

When responding to their attendance of agriculture teachers' workshops and/or seminars, 33.8 percent disagreed and 18.5 percent strongly disagreed that they attend PDA regularly. This implies that 52.3 percent of agriculture teachers do not attend PDA regularly. However, 36.4 percent agreed and another 6.6 strongly agreed that they have been attending PDA for agriculture teachers regularly. The focus group discussions that were held with the agriculture teachers revealed that those who fail to attend PDA regularly was due to the fact that they do not receive the invitation to the meetings. For others when they receive the information, the school administration is reluctant to allow them to attend the PDA claiming that teaching time will be lost. This indicates that, apart from the PDA being far apart, not all agriculture teachers get a chance to attend.

However, 38.4 percent disagreed and 19.9 percent strongly disagreed that the information provided during the seminars and workshops has been inadequate. This implies that 58.3 percent of agriculture teachers are of the opinion that they receive adequate information through PDA. However, while responding to the same item, 23.2 percent agreed and 11.9 percent strongly agreed, meaning that 35.1 percent of agriculture teachers' need for curriculum support through PDA is not being adequately met.

As to whether the agriculture teachers had attended PDA the previous twelve months before the study was undertaken, 38.4 percent of agriculture teachers agreed and 19.2 percent strongly agreed. When responding to the same item, 22.5 percent disagreed and 17.9 percent strongly disagreed meaning that 40.4 percent of agriculture teachers had not attended PDA in a span of 12 months prior to the study. This implies that as much as agriculture teachers agree that they receive information on appropriate teaching approaches during PDA, this seems to be far apart.

During focus group discussions, the respondents expressed their frustrations in not being exposed enough to workshops and seminars that would keep them updated on relevant agriculture information, better ways of teaching as well as fora where they can express or share challenges they face in teaching the subject. The agriculture teachers expressed their concern that the only time agriculture teachers had been invited for a meeting is usually to discuss KCSE results or to pass on a new policy affecting teaching of agriculture. The seminars are usually a one-way communication but as the participants expressed during the focus group discussions, they long for a forum where they can share and discuss challenges in teaching agriculture, that is, they want to be heard. This is in line with one of Knowles' readiness to learn principle of adult learning which explains that adults are ready to learn that which they need to know in order to cope effectively with life situations (Fernando & Marikar 2017). As Pistoe and Maila (2012) suggest, professional development for teachers should be intentional, that is, linked to the broader vision of the teaching profession and it should also be ongoing, meaning, it should not be a one-off activity but should be regular and frequent.

4.5.2 Testing Hypothesis Two

The second objective of this study was to investigate the relationship between selected curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County. From this objective, the following hypothesis was formulated and tested:

Ho_2: There is no statistically significant relationship between selected curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County.

In order to establish the relationship between curriculum factors and teaching approaches adopted by agriculture teachers, teachers' perceptions on various curriculum factors were first analyzed. The respondents gave their perceptions on the nine items presented (see Appendix A Section C) after which an aggregate score for each respondent was worked out. The aggregate score was used to place the respondents into three categories. Those whose aggregate score implied that they agreed with the items were placed on the positive category, those who disagreed were placed in the negative category and those that were neither positive nor negative were placed in the neutral category.

Table 29 indicates that the perception of 56.3 percent of the respondents towards the relationship between curriculum factors and teaching approaches was positive. Being in the positive category implies that they perceive the curriculum factors as important in determining the teaching approaches to use. However, 37.1 percent of the respondents did not agree with the fact that curriculum factors could be a consideration in choosing the teaching approach to use. Table 29 displays the frequencies and percentages of respondents in each of the three categories.

Table 29

Perceptions on Curriculum Factors-Teaching Approach Relationship

		Perception by frequencies and percentages			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Positive	85	56.3	56.3	56.3
	Neutral	10	6.6	6.6	62.9
	Negative	56	37.1	37.1	100.0
	Total	151	100.0	100.0	

The agriculture teachers' perceptions were further probed to establish the significance of the relationship between curriculum factors and teaching approaches used. Table 29 displays the crosstabulation of perceptions on curriculum factors and teaching approaches. The crosstabulation indicates the observed and expected count whose difference can be analysed to establish level of significance.

Table 29 shows that 45.9 percent of agriculture teachers were using blended teaching approach whereby within this teaching approach, 48.2 percent of them had negative perception about curriculum and those who had positive perception (47.6 percent) closely followed.

Demonstrator was the second most preferred teaching approach (33.1 percent) among whom 59.2 percent were positive and 34.7 percent were negative about curriculum factors as a determinant of the teaching approaches used.

The analysis on Table 30 indicates that there's a variation in proportion of agriculture teachers' perceptions and adoption of teaching approaches. Agriculture teachers with positive perceptions were found to have a higher proportion in the adoption of formal authority (66.7 percent), demonstrator (59.7 percent), delegator (72.7 percent) and blended (57.4 percent) teaching approaches compared to zero percent, 34.7 percent, 27.3 percent and 39.7 percent respectively for agriculture teachers whose perception about the curriculum factors was negative. It is only in the adoption of expert teaching approach did agriculture teachers with negative perception have a higher proportion (52.9 percent) compared to 23.5 percent for those whose perception was positive.

Table 30

*Perception of Curriculum Factors * Preferred Teaching Approach Crosstabulation*

			Preferred teaching approach					
			Expert teaching	Formal authority	Demon strator	Delegat or	Blended	Total
Perception curriculum factors	Positive	Count	4	2	29	8	39	82
		Expected Count	9.4	1.7	27.1	6.1	37.7	82.0
		% within Perception curriculum factors	4.9%	2.4%	35.4%	9.8%	47.6%	100.0%
		% within Preferred teaching approach	23.5%	66.7%	59.2%	72.7%	57.4%	55.4%
	Neutral	Count	4	1	3	0	2	10
		Expected Count	1.1	.2	3.3	.7	4.6	10.0
		% within Perception curriculum factors	40.0%	10.0%	30.0%	0.0%	20.0%	100.0%
		% within Preferred teaching approach	23.5%	33.3%	6.1%	0.0%	2.9%	6.8%
	Negative	Count	9	0	17	3	27	56
		Expected Count	6.4	1.1	18.5	4.2	25.7	56.0
		% within Perception curriculum factors	16.1%	0.0%	30.4%	5.4%	48.2%	100.0%
		% within Preferred teaching approach	52.9%	0.0%	34.7%	27.3%	39.7%	37.8%
Total		Count	17	3	49	11	68	148
		Expected Count	17.0	3.0	49.0	11.0	68.0	148.0
		% within Perception curriculum factors	11.5%	2.0%	33.1%	7.4%	45.9%	100.0%
		% within Preferred teaching approach	100%	100%	100%	100%	100%	100%

Based on the above variations, *Chi*-square test of independence was done to establish if there was a significant relationship between curriculum factors and the teaching approaches. The test was conducted at 95% confidence interval testing the following hypothesis:

$H0_2$: There is no statistically significant relationship between curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County.

Table 31 shows the results of the *Chi*-square analysis between curriculum factors and teaching approaches.

Table 31

Curriculum Factors and Teaching Approaches Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	19.082[a]	8	.014	.023		
Likelihood Ratio	17.751	8	.023	.026		
Fisher's Exact Test	16.310			.020		
Linear-by-Linear Association	.981[b]	1	.322	.330	.167	.012
N of Valid Cases	148					

a. 8 cells (53.3%) have expected count less than 5. The minimum expected count is .20.

b. The standardized statistic is -.991.

The results of *Chi*-square test of independence are displayed in Table 31. Since the cells with expected count being less than 5 are more than 20 percent, the Fisher's Exact Test result is referred. Thus, the *Chi*-square results, $\chi 2$ (8, N=148) = 16.31, p = .02, reveals that at 5 percent level of precision, teaching approaches adopted by agriculture teachers were dependent on the curriculum factors. The p value of the *Chi*-square test of independence was .02, which is less than .05. Hence there is enough evidence to reject the null hypothesis that there is no statistically significant relationship between curriculum factors and teaching approaches. Therefore, the results of the *Chi*-square test of independence shows that there is a relationship between curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru county.

Further analysis was done to find out the strength of the relationship between curriculum factors and teaching approaches. Cramer's *V* coefficient was worked and the results are shown in Table 32.

Table 32

Curriculum Factors and Teaching Approach Cramer's V test

		Symmetric Measures		
		Value	Approx. Sig.	Exact Sig.
Nominal by Nominal	Phi	.359	.014	.023
	Cramer's *V*	.254	.014	.023
N of Valid Cases		148		

A Cramer's *V* coefficient of 0 to .05 shows no relationship or very weak relationship, .05 to .10, weak, .10 to .15 moderate, .15 to .25 strong and >.25 very strong relationship (Akoglu, 2018). Table 32 shows a Cramer's *V* coefficient of .254 indicating that there exists a very strong relationship between curriculum factors and teaching approaches used by agriculture teachers in Nakuru county.

Several authors have related curriculum factors to teacher effectiveness. Adhikari (2017) posits that, teaching approaches used by teachers are dependent by several factors including, the syllabus, time pressure on teachers to cover the syllabus, and the assessment system. Ur (2013) concurs with the fact that assessment procedures influence how a teacher delivers the content. The author states that when there is a disconnect between what the curriculum intends to develop among the learners and what the examination system intends to assess, a confusion among the teachers is likely to arise concerning how to teach. In most cases, the teachers end up using teaching approaches that will drill the learners toward passing examinations. This is supported by Chaudhary (2015), who states that when the focus is on passing of examinations, teachers tend to teach to make students pass examinations and the broad objectives of teaching the subject may not be achieved.

When teachers perceive the syllabus content to be wide and time to cover the content is short, teachers tend to use whatever teaching strategies that will enable them to do in time. (Musasia et al., 2012). Appropriateness of the teaching approach to use may not be the main focus rather, covering the syllabus is.

4.6 Institutional Factors and Teaching Approaches

The third objective sought to investigate the relationship between selected institutional factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County. There were four selected institutional factors that were considered in this study

which are; class size, school farm, support by school administration and school library. The following section gives the descriptive statistics of the institutional factors that were considered in this study.

4.6.1 Class size and Teaching Approaches

The average agriculture subject class size was done at two levels (Form 1& 2 and Form 3& 4). Reason being that since agriculture is an optional subject, the students are given an opportunity as they join Form One to take or not to take the subject. A second opportunity is given at the end of Form Two to drop or continue with the subject. Three categories of class size were availed to agriculture teachers to choose which category was applicable for both the lower and higher classes. The three categories of class sizes were; less than 20, 21 to 50, and above 50 students in an agriculture class.

The agriculture teachers were asked to indicate the class size of the agriculture classes they taught which was in terms of number of students that are registered for the subject in Form 1 and 2. Figure 10 presents the findings on agriculture class size for Form 1and 2.

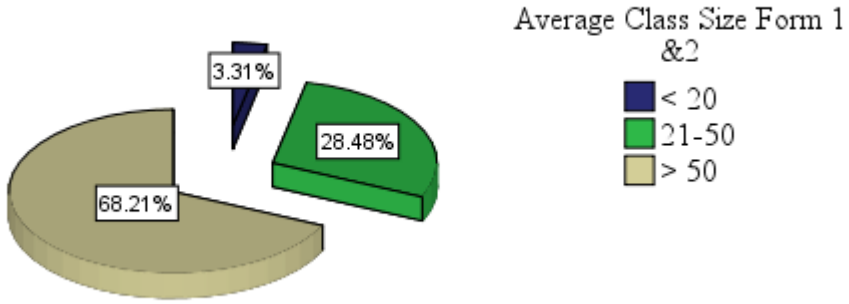

Figure 10: Agriculture Class Size for Form 1 & 2

It is evident from Figure 10 that most of the agriculture teachers (68.21 percent) have more than 50 students in Form One and Two agriculture classes. Another 28.48 percent agriculture teachers had a class size of 21-50 and only 3.31 percent of the agriculture teachers had a class size of less than twenty students. From the focus group discussions as well as classroom observations made by the researcher, it emerged that some teachers are handling classes of up to 60 or more students in a class. Instances where the class sizes are small (less than 20), the agriculture teachers reported that the respective schools have a wide variety of subjects to choose from. Such a situation is found in national and extra-county public secondary schools.

The scenario of agriculture teachers teaching large classes is bound to persist or get worse as a result of the Kenya government's 100 percent primary to secondary school transition policy (Ministry of Education, 2019; Ndolo & Simatwa, 2016). From the focus group discussions, the agriculture teachers reported that agriculture has become a subject for all students who are not registered for the other optional technical subjects offered in the school. The argument being that, other technical subjects like computer studies, home science, wood-work, metal-work, art and design can only take as many students as the facilities available can allow. This is done without considering adequacy of facilities required to teach agriculture like school farm, tools and equipment required for teaching purposes. The agriculture class therefore ends up having many students without a consideration of class size or availability of resources to teach the subject.

In Form 3 and 4 classes, the class size adjusts slightly though not as much as would have been expected. Agriculture being an optional subject, the class size is bound to change as students transit from Form 2 to Form 3. For the higher classes, Form 3 and Form 4, the class size is expected to be smaller since some students drop the subject as they proceed to Form 3. From the focus group discussions, some participants reported that the class sizes for agriculture were so small (less than 10 students) that students had to be talked to and encouraged to take the subject. Small class sizes are usually found in national and extra-county public secondary schools where the range of technical subjects to choose from is wide. On the other hand, some public secondary schools have such large classes that the agriculture teacher has a challenge in handling the lesson. Large sizes are mainly in sub-county schools which have a narrow range of optional technical subjects for students to choose from. It would be expected that more options of technical subjects to select from are availed to the majority of students. The sub-county public secondary schools are the majority and they host a high proportion of agriculture students. From the ATQ, the agriculture teachers indicated the class size for Form 3 and 4 and the results were as presented in Figure 11.

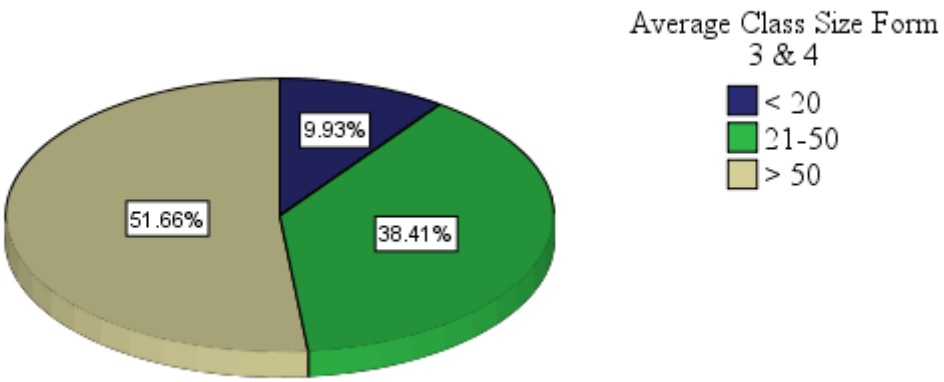

Figure 11: Agriculture Class Size for Form 3 & 4

It is of interest to note that though the percentage of large class size reduces from 68.21 percent (Form 1 & 2) to 51.66 percent (Form 3 & 4), as the agriculture students transit to Form 3, the category of class size with above 50 students continues to dominate. The class size category of 21-50 increases from 28.48 percent (Form 1 & 2) to 38.41 percent for Form 3 and 4 classes. Though the percentage of large classes (above 50) reduces in Form 3 and Form 4; after some students have dropped the subject, the reduction is not as would have been expected. This, as the focus group discussions revealed, could be explained by the fact that due to inadequate supply of agriculture teachers and facilities like classrooms, students from different streams in Form 3 or Form 4 are often combined into one agriculture class.

During class observations, the researcher witnessed a Form 4 class with above one hundred students being taught in one room. Weimer (2011) gives the benefits of student participation during the lesson which learners may not benefit from when the class size is too large. The other reason for large number of students for the upper classes (Form 3 and 4) is inadequate facilities particularly classrooms where the agriculture students can break away into during the agriculture lesson. This is so because the optional subjects are scheduled to be taught at the same time on the main school timetable. This may require extra rooms to handle the different groups taking different optional subjects for which some schools are not able to cater for. Lack of adequate facilities has led to agriculture lessons being held outdoors, sometimes under a tree as Kyule et al. (2016) found out in a study conducted in Kenya.

Most of the focus group participants voiced that their agriculture classes have more than 50 students. For the lower classes the number of students can grow up to 80 and in a few cases up to 100 students. Class sizes are getting larger as the 100 percent primary to secondary school transition policy is being implemented. The policy requires that all learners who have completed

their primary level education to proceed to secondary level of education. According to the participants, some classes are so overcrowded such that the teacher is left with very little space to even turn, do demonstrations in class or organize for group work in class. This is bound to affect the teacher-student interaction in class as well as the teaching approach used by teachers (Tondeur et al., 2015).

Large class sizes, according to focus group participants, hinder the use of teaching approaches that require the use of field trips, class projects, practical work and even demonstrations. Due to large class sizes, some said that they ride on the young farmers' club projects and use them as teaching resource. This may not be very effective because for one to learn a skill there is need to practice it, not just observing the implemented work of another. Kyule et al. (2016) note that the school farm enables the learners to translate the theory learnt into practical realities which helps to enhance understanding and retention and also acquire agricultural skills.

Another dimension of the effect of large class sizes that came up in the focus group discussions is the fact that in an examination-oriented education system, the students are over tested. In some schools, monthly examinations are given to students which mean that the agriculture teacher spends a substantial amount of time in setting and marking examinations at the expense of adequate planning for teaching agriculture content.

Agriculture teachers were asked to respond to five items that concerned class size. The descriptive analysis showing the percentages of their responses is shown on Table 33.

Table 33

Class Size and Teaching of Agriculture

Item		Responses in frequencies and percentages					
		SD	D	U	A	SA	Total
It is easy to organize a field trip for my class	Freq.	21	46	12	61	11	151
	%	13.9	30.5	7.9	40.4	7.3	100
The number of students in my class is large	Freq.	41	45	7	37	21	151
	%	27.2	29.8	4.6	24.5	13.9	100
The small number of students in my class makes it easy for me to use the teaching approach	Freq.	41	45	11	34	20	151
	%	27.2	29.8	7.3	22.5	13.2	100
Number of students makes it easy to carter for the resources needed for teaching agriculture	Freq.	33	60	12	37	9	151
	%	21.9	39.7	7.9	24.5	6.0	100
Number of students in my class is fairly small hence easy to manage	Freq.	46	43	9	45	8	151
	%	30.5	28.5	6.0	29.8	5.3	100

Table 33 indicates that, 40.4 percent of respondents agreed and 7.3 percent strongly agreed that they find it easy to organize for field trips for their students. In response to the same item, 30.5 percent disagreed and 13.9 percent strongly disagreed thus acknowledging that they find it difficult to organize for a field trip for their students. However, from focus group discussions, many of the participants expressed that lack of use of field trips is constrained by other factors other than their ability or willingness to organize for one. These constraints include; large class sizes, lack of support from the school administration, and expenses involved.

When asked whether the class size makes it easy for them to carter for learning resources, 39.7 percent disagreed and 21.9 percent strongly disagreed. The responses given indicate that a total of 61.6 percent of the respondents acknowledge that it is not easy to supply adequate learning resources. In response to the same item, 24.5 percent of the respondents agreed and 6.0 percent strongly agreed that they find it easy to supply learning resources to the students. This is confirmed by the classroom observation done where in 80 percent of lessons observed, the agriculture teachers did not use learning materials. In addition, where learning materials were used, they were not adequately supplied and distributed for all students to use. This challenge may be pushing

agriculture teachers towards the use of teaching approaches that require minimal use of teaching resources, which in most cases are less appropriate.

Class size seems to be affecting class management in that 30.5 percent strongly disagreed and 28.5 percent disagreed with the fact that they find it easy to manage the classroom when teaching. This may imply that 59.0 percent of agriculture teachers may be having challenges in classroom management imploring them to spend more time in managing students in class instead of devoting most of the time in content delivery. This aspect of having difficulties in managing their classes could also be compounded by the fact that a large number of the agriculture teachers (37.1 percent) are young, aged between 20 and 30 years and 39.1 percent have five years or less of teaching experience.

4.6.2 School Farm and Teaching Approaches

During the focus group discussions, the participants were in agreement that schools have land for practicing agriculture. However, the adequacy of the school farm was not the same for all. Some said that land availed to the students was only enough for the Form 4 examination project, thus the lower classes have no space on the school farm where they could do their projects or practical work. In one of the schools visited during the study, the number of Form 4 students was so large that the agriculture teacher allocated smaller sized plots than recommended by KNEC due to lack of enough land.

During the focus group discussions, it emerged that some teachers were resorting to the use of ICT or digital devices to show videos in class to simulate a farm process instead of having practical work or demonstrations for the students. Integration of ICT in teaching is recommended and it has many benefits but, practical skills are best learnt by doing. In other schools the land was available but lack of water was a hindrance for them to initiate any group or individualized projects. In one focus group, participants shared of how the agriculture students are asked to carry water from home to irrigate the crops since water is a limited resource within the school. Such requirements are likely to discourage the agriculture teacher from using projects as a teaching approach and students from participating in agriculture projects.

In reference to the school farm, the respondents were presented with items that concern the availability, adequacy and use of the school farm for teaching purposes. The analysis of the agriculture teachers' responses is presented on Table 34.

Table 34

School Farm's Adequacy for Teaching Agriculture

		Response in frequencies and percentages					
Item		SD	D	U	A	SA	Total
The school has adequate land for teaching purposes	Freq.	23	34	7	59	28	
	%	15.2	22.5	4.6	39.1	18.5	
The school does not provide adequate land for students work	Freq.	16	25	10	64	36	
	%	10.6	16.6	6.6	42.4	23.8	
The school farm is for commercial purposes only	Freq.	9	12	6	55	69	
	%	6.0	7.9	4.0	36.4	45.7	

Concerning the school farm, the analysis presented on Table 34 indicates that, 45.7 percent of the agriculture teachers strongly agreed and 36.4 percent agreed that the school farm is for commercial purposes only. This response implies that there is a possibility that adequate land may not be availed for teaching purposes. However, 6.0 percent strongly disagreed and 7.9 percent disagreed that the school farm was for commercial purposes only. When asked to respond to whether the school has adequate land for teaching purposes, 39.1 percent of the respondents agreed and 18.5 percent strongly agreed. However, 22.5 percent of the respondents disagreed and 15.2 percent strongly disagreed that the school has adequate land for teaching purposes.

As for adequacy of land for students learning activities, 42.4 percent of respondents disagreed and 23.8 percent strongly disagreed with the fact that the school does not provide enough land for students work. It emerged from the focus group discussions that as much as most schools have adequate land for teaching purposes, the agriculture teachers hardly use them for teaching purposes. Thus, if schools have enough land for students work, it is not clear why agriculture teachers were not using projects and farm demonstrations adequately as teaching approaches that can help the learners acquire practical skills in agriculture. From the focus group discussions, it was apparent that when the agriculture teachers say that the school farm is available for students work, some were referring to the Form 4 project which is in itself an assessment activity by KNEC and not a learning activity planned by the agriculture teacher. However, for some agriculture teachers, the land was available for Form 1, 2 and 3 classes yet hardly used for teaching purposes. It is apparent therefore that there could be other factor(s), other than availability and adequacy, that limit the use of the school farm for teaching purposes.

In their study on influence of instructional resources on teaching of agriculture, Aholi et al. (2018) state that sometimes teachers' attitude and inadequate funds lead to underdevelopment of the school farm. This means that the agriculture teachers may not see the need to develop the farm to suitable levels for learners' practical experience. Lack of adequate funds may also deter the agriculture teacher from utilizing the school farm for teaching purposes.

4.6.3 School Administration's Support and Teaching Approaches

School administration's support for teaching of agriculture was studied and most participants expressed that they get adequate support especially in providing funds to purchase teaching resources. However, for some, the school was not so willing to purchase farm inputs for the students to start off projects on the school farm. Some participants expressed frustration of the school administration's failure to purchase farm produce from the students work but opted to buy the same from elsewhere and the students' projects stall with time as the students become unmotivated.

Participants in the focus group discussions also expressed that the school administration's support on the use of field trips for agriculture students had been quite a challenge for most of them. The school administration would sometimes insist that only those students who have paid up their school fees will go, or they may go but they pay for transport and any other related cost, or the school administration takes advantage and charges the students a lot of money. In some instances, school administrators will only give permission for field trips during the weekend (Saturday and Sunday) in order to avoid loss of lesson time. This lessens the opportunities of taking the agriculture students out on a field trip since the areas of interest are open during the weekdays, Monday to Friday. Therefore, the absence of adequate support by the school administration, limits the agriculture teacher's choice of teaching approaches to use. Kennedy (2014) posits that the benefits of field trips consist of cognitive, social and affective development of the learners. These are benefits that the agriculture students are not fully gaining from.

The ATQ had items that required the respondents to state their level of agreement or disagreement on issues concerning school administrations support. The analysis of the agriculture teachers' responses is indicated on Table 35.

Table 35

School Administration's Support of Agriculture's Teaching Activities

Item		Responses in frequencies and percentages					
		SD	D	U	A	SA	Total
It is easy to plan for students' activities outside the normal lesson time allocated	freq.	26	57	5	58	5	151
	%	17.2	37.7	3.3	38.4	3.3	100
The school schedule allows for extra time for activities outside timetabled classroom activities	freq.	41	43	13	47	7	151
	%	27.2	28.5	8.6	31.1	4.6	100
The school is not supportive of teaching approaches that require the use of funds	freq..	15	47	23	49	17	151
	%	9.9	31.1	15.2	32.5	11.3	100
School schedule is very tight with no extra time for learning activities outside class time	freq.	32	41	10	49	19	151
	%	21.2	27.2	6.6	32.5	12.6	100
There is little administrative support in teaching and learning using activities outside the class timetable	freq..	11	27	11	73	29	151
	%	7.3	17.9	7.3	48.3	19.2	100
I cannot depend on the school for access to essential teaching aids.	freq.	14	40	7	65	25	151
	%	9.3	26.5	4.6	43.0	16.6	100
It is easy to approach the school administration for any support I need for my teaching	freq.	48	57	10	19	17	151
	%	31.8	37.7	6.6	12.6	11.3	100
Funds are easily availed by the school to purchase teaching resources required	freq.	34	43	17	42	15	151
	%	22.5	28.5	11.3	27.8	9.9	100

Analyses of items referring to school administration's support in Table 35 indicate that 38.4 percent of agriculture teachers agreed that it is easy to plan for students learning activities outside the scheduled lesson time. It is worth noting that a higher proportion of respondents were negative on the same item, 37.7 percent disagreed and 17.2 strongly disagreed. This implies majority of agriculture teachers are of the opinion that the school's daily schedule does not favour the students in terms of having extra time outside the lesson time to work on agriculture projects. The intention was to find out whether the school's daily schedule can accommodate students having some time, outside the main teaching time, when they can plan to attend to their agriculture projects.

Support from the school administration in terms of funding teaching activities, 32.5 percent agreed and 11.3 strongly agreed while 31.1 percent disagreed and 9.9 strongly disagreed that the school is not supportive of teaching activities that require funds. The proportion of those who positive (43.8 percent) about the item are fairly equal with those who are negative (41 percent) yet the use of the school farm for teaching purposes by the teachers is minimal.

Participants in the focus group discussions posited that the school's daily schedule is so tight in most schools that it is difficult for students to carry out follow up activities on their agriculture projects outside the class time. This was confirmed by the response to whether the school schedule allows for extra time for learning activities outside the lesson time. To this item, analysis on Table 35 indicates that 28.5 percent of agriculture teachers disagreed and 27.2 percent strongly disagreed that the school schedule allows for extra time for activities outside the lesson. This shows that majority of the agriculture teachers experience lack of enough time outside the designated lesson time when they can guide the learners in their agriculture projects. However, 31.1 percent agreed and 4.6 strongly agreed that the school schedule allows for extra time for learning activities outside class time. It is not fully clear why agriculture teachers in schools whose daily schedule allows for time outside the normal lesson time do not use teaching approaches that incorporate project activities. However, insights from focus group discussions indicate that when teaching workload is high, agriculture teachers view project work as an activity that demands more time, a resource that is scarce.

Table 35 indicates that 48.3 percent of agriculture teachers agreed and 19.2 percent strongly agreed that there is little school administration support for teaching and learning activities outside the class timetable. When the school daily schedule is tight, it implies that the teachers are engaged in activities that occupy the students at that time hence agriculture teachers may perceive that the school administration does not consider that they need time in the school farm with the students to attend to the projects. This may have led to scanty use of project as a teaching approach in agriculture given the fact that agriculture teachers decried that number of lessons allocated for syllabus coverage are not adequate.

Their responses also touch on activities like the use of field trips where most school administrators do not support this teaching and learning activity due to the expenses involved and also the time that such activities consume. This was supported by the focus group discussions where the agriculture teachers reported that most school administrators do not support the use of field trips in teaching agriculture due to various reasons mainly inadequate funds and waste of learning time for other subjects.

On availability of funds to facilitate teaching of agriculture, 32.5 percent agreed and 11.3 percent strongly agreed that the school administration is not supportive of teaching activities that require funds. At the same time, 28.5 percent of agriculture teachers disagreed and 22.5 percent strongly disagreed that funds are not easily availed by school administration to purchase required teaching resources. This is supported by the fact 43.0 percent agreed and 16.6 percent strongly agreed with the fact that they cannot depend on the school for access to teaching aids. Use of teaching resources in class was observed in only 20 percent of the lessons which is supported by the responses given by the agriculture teachers. This suggests that the majority of the agriculture teachers have a challenge in getting adequate school administration's support in acquiring teaching resources that require funding. Thus, if the administrative support given to agriculture teachers is not adequate enough for acquiring suitable teaching resources like farm inputs, tools and equipment, then, agriculture teachers are likely to settle for less appropriate teaching approaches. The use of teaching resources needs to be interrogated further since there are a lot teaching resources that do not require to be purchased since they can be collected from the environment. During the focus group discussions and from data collected using ATQ, high workload denies agriculture teachers adequate time to plan and prepare for lessons.

On the approachability of the school administrator concerning support required for teaching of agriculture, 37.7 percent of agriculture teachers disagreed and a further 31.8 percent strongly disagreed that it is easy to approach the school administration for support in teaching. This shows that the rapport between the agriculture teachers and the school administrators is not good. The relationship between the agriculture teachers and the school administrators seems to be poor which may explain why funding teaching activities in agriculture is not adequately done. Musah et al. (2018) states that in order to enhance the development of teachers' capabilities, a positive relationship between a head teacher and teachers is crucial. Ocen (2014) supports this by saying that a teacher's teaching behaviour is enhanced when there is a good cordial relationship between the teacher and head teacher. It is important to investigate the relationships between agriculture teachers and head teachers for interventions to be applied that can improve this relationship.

Mahgoub (2014) suggests that field trips should be made part of the teaching and learning schedule since it provides an opportunity for learners to use their own senses to understand information by themselves. This is supported by others, Bowen (2014) and Kennedy (2014) who posit that field trips as a learning experience, when incorporated in the curriculum, has many benefits which include cognitive, social and affective development of the learners. Probably the school administrators view field trips as a day away from learning but they need to understand that

this approach to teaching and learning is invaluable for learners' understanding of agriculture content.

4.6.4 School Library and Teaching Approaches

Regarding the use of the library for teaching purposes, the analysis of agriculture teachers' responses is shown in Table 36.

Table 36

Adequacy of the School Library for Teaching

Item		Responses in frequencies and percentages					
		SD	D	U	A	SA	Total
There are extra agriculture reference materials available for the students in the library.	freq.	22	42	10	64	13	151
	%	14.6	27.8	6.6	42.4	8.6	100
The library is equipped with enough agriculture reading materials the students can refer to.	freq.	43	60	6	30	12	151
	%	28.5	39.7	4.0	19.9	7.9	100
The school library has up-to-date agriculture reference materials for students to read.	freq.	41	52	7	38	13	151
	%	27.2	34.4	4.6	25.2	8.6	100
Students have enough time to access the agriculture reading materials in the library.	freq.	36	58	8	37	12	151
	%	23.8	38.4	5.3	24.5	7.9	100

Table 36 indicates that 42.4 percent of agriculture teachers agreed and 8.6 percent strongly agreed that there are agriculture reference materials available for the students. On the same item, 27.8 disagreed and 14.6 percent strongly disagreed. This implies that school libraries have extra reference materials that students can use to further understand agriculture content taught in class or to complete class assignments. However, 39.7 percent disagreed while another 28.5 percent strongly disagreed on the adequacy of the reference materials. This implies that though agriculture reference materials may be available in the library, the materials are few to be shared equitably by the number of agriculture students present. This situation could be aggravated by the growing class sizes as more students join secondary schools. In addition, 34.4 percent of the respondents disagreed and another 27.2 percent strongly disagreed that the materials were up-to-date. From the focus group discussions, the participants shared on how some schools have no libraries and where they exist, they are poorly equipped with up-to-date reference materials for agriculture students.

They reported that in a number of schools the library acts as a store where students and teachers collect and store the recommended text books for class use. This implies that the libraries may hardly provide adequate additional reading materials where students can get extra information on topics covered in class.

In addition, the focus group participants revealed that the school library is where the out-dated books from the previous education system(s) are stored and sometimes the book donations made are of old books. This may neither be very appropriate in motivating the agriculture students in learning the subject nor in providing current agricultural technologies. According to Adeniyi and Ojo (2015), a well-equipped library is an important component of any educational institution and they act as sources of information that can lead to better acquisition of agricultural knowledge. Saavedra and Opfer (2012) posits that teachers need to teach learners how to learn on their own which is critical in allowing the learners to acquire the learning to learn skill. The learning to learn is one of the key skills of the 21st century which is crucial since learners cannot learn everything in class.

Lack of up-to-date materials in the school libraries insinuates that the agriculture teacher may not direct the agriculture students to source for information from the library which is a way of developing students' skills in locating and using information. Ogbebor (2011) posits that, libraries should provide materials that help students to perform their classwork. The agriculture teachers and the students therefore, when limited to the use of the class textbook, narrows their source of information. For instance, when the agriculture teacher gives an assignment to groups or individuals to research on a topic and give a report, the students are in most cases limited to one or two types of class textbooks that they have been provided with.

When asked if students have enough time to access materials in the library, 38.4 percent disagreed while another 23.8 percent strongly disagreed. This alludes that the agriculture teachers hardly give learning tasks to agriculture students that will require the use of the school library. From the focus group discussions, some participants reported that the school schedule is too tight to allow enough time for the agriculture students to visit the school library and do some meaningful research. They claimed that in some schools, at best, the students have just a little opening in the busy school's daily schedule to exchange books at the school library and this is often done once a week. Generally, the students have little time to visit the library, the materials are too few to be shared adequately among them let alone the fact that they are not up-to-date. The implication of this is that teaching approaches that would require the teacher to direct or train students how to collect information by themselves is unattainable.

When probed further, agriculture teachers acknowledged that getting information from the internet is out of reach since only schools that offer computer studies have internet connectivity and only students enrolled for the subject have limited access to internet. Thus, besides computer literacy issues, access to the internet is also a challenge to both the agriculture teachers and students. Use of ICT is an area that requires to be developed in school since it can be a source of current information for learning purposes.

In summary, the school libraries have agriculture reference materials that are not enough, are out-dated and the students lack adequate time to use the materials present in the library. The school libraries lack adequate print and non-print materials for students use. Therefore, this makes the school libraries, in their present condition, unsuitable for use by the agriculture teachers for teaching purposes which in turn limits the choice of teaching approaches they can use.

4.6.5 Testing Hypothesis Three

The third objective was to investigate the relationship between institutional factors and teaching approaches used by agriculture teachers in Nakuru county from which the following hypothesis was formulated and tested:

$H0_3$: There is no statistically significant relationship between institutional factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County.

To investigate the relationship between institutional factors and teaching approaches adopted by agriculture teachers, teachers' perceptions on various institutional factors were first analyzed. Section B of ATQ had twenty items dealing with institutional factors that were set to measure this construct. The respondents gave their perceptions on the statements presented after which an aggregate score for each respondent was worked out. Those whose aggregate score implied that they agreed with the items were placed on the positive category, those who disagreed were placed in the negative category and those that were neither positive nor negative were placed in the neutral category. The perceptions of agriculture teachers on institutional factors indicated on Table 37.

Table 37

Perceptions of Institutional Factors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Positive	49	32.5	32.5	32.5
	Neutral	11	7.3	7.3	39.7
	Negative	91	60.3	60.3	100.0
	Total	151	100.0	100.0	

Table 37 indicates that 60.3 percent of agriculture teachers have negative perception while 32.5 percent had positive perception on institutional factors. The relationship between agriculture teachers' perceptions on institutional factors and teaching approaches was probed and the results are visualized in Table 38.

Table 38

*Perceptions of Institutional factors * Preferred Teaching Approach Crosstabulation*

			Preferred teaching approach					
			Expert teaching	Formal authority	Demonstrator	Delegator	Blended	Total
Perceptions of Institutional Factors	Positive	Count	1	17	5	6	19	48
		Expected Count	1.0	15.9	3.6	5.4	22.1	48.0
		% within Perception Institutional factors	12.5%	2.1%	35.4%	10.4%	39.6%	100.0%
		% within Preferred teaching approach	35.3%	33.3%	34.7%	45.5%	27.9%	32.4%
	Neutral	Count	0	0	8	1	2	11
		Expected Count	1.3	.2	3.6	.8	5.1	11.0
		% within Perception Institutional factors	0.0%	0.0%	72.7%	9.1%	18.2%	100.0%
		% within Preferred teaching approach	0.0%	0.0%	16.3%	9.1%	2.9%	7.4%
	Negative	Count	11	2	24	5	47	89
		Expected Count	10.2	1.8	29.5	6.6	40.9	89.0
		% within Perception Institutional factors	12.4%	2.2%	27.0%	5.6%	52.8%	100.0%
		% within Preferred teaching approach	64.7%	66.7%	49.0%	45.5%	69.1%	60.1%
Total		Count	17	3	49	11	68	148
		Expected Count	17.0	3.0	49.0	11.0	68.0	148.0
		% within Perception Institutional factors	11.5%	2.0%	33.1%	7.4%	45.9%	100.0%
		% within Preferred teaching approach	100%	100%	100%	100%	100%	100%

Analysis in Table 38 indicates that 45.9 percent of agriculture teachers who had blended as their preferred teaching approach, 39.6 percent were positive about institutional factors while 52.8 percent had negative perceptions. The second highest preferred teaching approach in popularity was the demonstrator type with 33.1 percent. Of interest is that those who had adopted

demonstrator teaching approach as their preferred teaching approach, 72.7 percent were neutral on their perceptions on institutional factors. Among agriculture teachers who had expert or formal authority as their preferred teaching approach, 12.5 percent and 2.1 percent respectively had positive perceptions towards institutional factors, and a similar proportion 12.4 percent and 2.2 percent respectively had negative perceptions. None were found to have a neutral status of their perceptions. Table 38 also shows variations between the observed and the expected count.

Based on the variations between expected and observed count, *Chi*-square test of independence was performed to find out if there was a link between institutional factors and the teaching approaches used by agriculture teachers. The test was conducted at 95% confidence interval testing the following hypothesis:

Ho_3: There is no statistically significant relationship between institutional factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County.

The results of the *Chi*-square test of independence to assess the relationship between institutional factors and teaching approaches are displayed on Table 39.

Table 39

Institutional Factors and Teaching Approaches Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	12.108[a]	8	.146	.137		
Likelihood Ratio	12.821	8	.118	.141		
Fisher's Exact Test	11.215			.139		
Linear-by-Linear Association	1.027[b]	1	.311	.315	.162	.012
N of Valid Cases	148					

a. 7 cells (46.7%) have expected count less than 5. The minimum expected count is .22.

b. The standardized statistic is 1.013.

The results of *Chi*-square test of independence displayed in Table 39 indicate that cells with expected count being less than 5 are more than 20 percent, hence the Fisher's Exact Test result is referred. Thus, the results of the *Chi*-square test of independence [$\chi 2$ (8, N=148) = 11.21, p = .139] indicate that there is no statistically significant relationship between institutional factors and teaching approaches. The chi-square test of independence reveals that at $p \leq .05$ level of precision, teaching approaches adopted by agriculture teachers were not associated with the institutional

factors. The p value of .139 obtained from the test is greater than .05 hence the null hypothesis is not rejected. This means that there is no statistically significant relationship between institutional factors and teaching approaches.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the study based on the research objectives and hypotheses. The primary data obtained from respondents was analyzed to give the findings of this study from which this summary is drawn. Theoretical and empirical literature in chapter two was used to compare the findings of this study and conclusions drawn. Recommendations for both policy and practice are drawn from the conclusions made and suggestions for further research given.

5.2 Summary

One of the objectives of teaching secondary school agriculture is to have the learners acquire practical skills that would make them self-reliant as well as prepare them for further training. Teachers have the power to make an education system successful during implementation of the curriculum by how they teach. Through their efforts, the learners acquire knowledge and skills. The purpose of this study was to investigate the relationship between selected teacher, curriculum and institutional factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County.

A correlational research design was used to examine the relationship between the dependent variable and independent variable. A sample size of 151 agriculture teachers was drawn from the four categories of public secondary schools in Nakuru County (National, Extra-county, County and Sub-county schools). Data was collected through the ATQ, classroom observations and focus group discussions.

Chi-square test of independence was used to test the relationship between the dependent and independent variable. Hypothesis one sought to find out whether teacher factors (teacher's age; teacher's gender; academic qualification and teaching experience) have any association with teaching approaches used by agriculture teachers. *Chi*-square test of independence was performed to test the relationship between the individual teacher factor and teaching approaches, the results indicated that teachers' age and teaching experience teacher factors were significantly related to teaching approaches while gender and highest academic qualification teacher factors were found not to have a significant relationship with teaching approaches used by agriculture teachers. A multinomial logistic regression was performed to indicate the relationship between the teacher factors and teaching approaches and results showed that there no significant relationship between teacher factors and teaching approaches and hence hypothesis one was accepted.

Hypothesis two was tested using *Chi*-square test of independence and the curriculum factors (syllabus, teaching workload, agriculture subject assessment and professional development for teachers) were found to have a significant relationship with teaching approaches used by agriculture teachers. Cramer's *V* coefficient reveals that it is a strong relationship between the curriculum factors and teaching approaches used by agriculture teachers. Therefore, hypothesis two was rejected.

Lastly, hypothesis three when subjected to *Chi*-square test of independence showed that there is no significant relationship between institutional factors (school farm, school administration support, school library and class size) and teaching approaches. Hypothesis three was thus accepted.

5.3 Conclusions

Based on the findings of the study, the following conclusions are made:

a. Teacher factors (age, gender, teaching experience and highest academic qualification) have no significant relationship with the teaching approaches used by the agriculture teachers.
b. Curriculum factors (syllabus, professional development activities, teaching workload and examination mode) have a significant relationship with teaching approaches used by agriculture teachers in secondary schools.
c. Institutional factors (school farm, school library, class size and school administration's support) have no significant relationship with teaching approaches used by agriculture teachers in secondary schools.

5.4 Recommendations

Based on the conclusions, the following are the recommendations of the study:

a. Teachers' service commission needs to find ways of retaining agriculture teachers in secondary schools. This would increase the proportion of experienced agriculture teachers in teaching who have learnt over time what teaching approaches are best. The experienced teachers can be encouraged to mentor the less experienced teachers.
b. The agriculture curriculum developers and reviewers need to interrogate curriculum factors that may be hindering the agriculture teachers from utilizing appropriate teaching approaches. There is a need therefore to review the agriculture curriculum to ensure that there is a balance between agriculture content to be covered and time allocated for covering the syllabus. The education quality assurance office should organize continuous or more regular professional development activities that are focused on supporting the agriculture

subject teacher in keeping up to date with current innovations in agriculture, appropriate pedagogical procedures and how to handle the challenges that come about as the teachers implement educational policies. Teaching workload is an important consideration to ensure that agriculture teachers have adequate time for planning lessons and assessing students and the examinations should be perceived to test both knowledge and skills acquired by learners. This is key in the success of the new CBE system.

c. Ministry of Education should ensure that schools are endowed with enough facilities and resources for teaching and learning agriculture. The requirements for teaching agriculture would be a workshop dedicated to agriculture teaching, enough land for students learning and practice, tools and equipment, funds for carrying out the learning activities and a well-equipped school library. It would be important to have a technician to assist the agriculture teacher in preparing materials for teaching and learning purposes. The limits given by the MoE for a class size need to be adhered to make the use of learner centered teaching approaches more attractive to agriculture teachers.

5.5 Suggested Areas for Further Research

The following gaps were realised during the study which may need further investigation:

a. Agriculture subject has approaches to teaching that requires certain activities to be included significantly as part of the teaching and learning process in order for the learners to acquire the requisite skills. These activities include practical sessions in the farm or workshop and field trips to areas of academic interest. There is a need to find out whether the school principals are aware of this orientation to teaching of agriculture which would mean that the support given to the agriculture teachers can be improved.

b. Agriculture teachers seem to rely on the official PDA organized for them. It is of interest to find out how much personal, small group or school initiatives are being made towards professional development of agriculture teachers.

c. Though institutional factors were found not related to the teaching approaches used by agriculture teachers, there is need to probe this further probably using different research designs.

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APPENDICES

Appendix A: Agriculture Teacher Questionnaire

Introduction: I am Mary Waiganjo, a student at Egerton University pursuing Doctor of Philosophy studies in Agricultural Education. As part of my studies, I am carrying out a research on 'Relationship between selected teacher, institutional and curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County'. I therefore request you to take some time to participate in the study by responding to this questionnaire. I would like to assure you that the information you provide will be treated with confidentiality and will only be used for the purpose of this study.

SECTION A

This section intends to collect information about your school and you as the agriculture teacher. For each item, please indicate your most appropriate response with a tick (√).

1. School Characteristics

i. School Category

1. National □ 2. Extra-County □ 3. County □ 4. Sub-County □

ii. School Type

1. Girls school□ 2. Boys school □ 3. Mixed School □

iii. Mode of Schooling

1. Day □ 2. Boarding □ 3. Day/Boarding □

iv. Average Class Size (Number of students in your agriculture class)

Form 1&2 < 20□ 21-50□ >50□

Form 3&4 < 20□ 21-50□ >50□

2. Teacher Characteristics

i. Gender: Male ☐ Female☐

ii. Age: 20-30 Years☐ 31-40 Years☐ >40 Years☐

iii. Highest Academic qualifications

Diploma☐ BSc/B Ed☐ Masters☐ PhD ☐

iv. Teaching experience: 0-5 years☐ 6-10years☐ >10years ☐

3. Teachers Workload

Workload: < 18lessons/week ☐ 18-27 lessons/week☐ >27 lessons/week ☐

SECTION B

This section intends to find out how much school factors are associated with the way you teach agriculture. For each statement, please indicate your most appropriate response with a tick (□) in one of the boxes to the right. Use the key below to choose your response. Please note that there is no correct or incorrect response.

1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree

	I choose the teaching approach to use based on the fact that:-	1	2	3	4	5
1	It is easy to plan for students activities outside the normal lesson time allocated					
2	The school has adequate land for teaching purposes					
3	The school schedule allows for extra time for activities outside timetabled classroom activities					
4	There is extra agriculture reference material available for the students in the library					
5	It is easy to organize a field trip for my class					
6	The number of students in my class is large					
7	The library is equipped with enough agriculture reading materials the students can refer to.					
8	The school is not supportive of teaching approaches that require the use of funds					
9	School schedule is very tight with no extra time for learning activities outside class time					
10	The school does not provide adequate land for students work					
11	The number of students in my class makes it easy for me to use the teaching approach					
12	The school farm is for commercial purposes only					
13	It is easy to approach the school administration for any support I need for my teaching					
14	The school library has up-to-date agriculture reference materials for students to read					
15	Funds are easily availed by the school to purchase teaching resources required					
16	Number of students in my class makes it easy to carter for the resources needed for teaching agriculture					

17	There is little administrative support in teaching and learning using activities outside the class timetable					
18	I cannot depend on the school for access to essential teaching aids					
19	Number of students in my class is easy to manage for teaching purposes					
20	Students have enough time to access the agriculture reading materials in the library					

SECTION C

This section intends to find out if there is any association between curriculum factors and how the agriculture teachers teach the subject. For each item, please indicate with a tick (□) in one of the boxes to the right your most appropriate response. Use the key below to choose your response. Please note that there is no correct or incorrect response.

1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree

	I choose the teaching approach to use based on the fact that:-	1	2	3	4	5
1	The students get enough knowledge to pass agriculture national examination (KCSE)					
2	I have had exposure to new teaching approaches through seminars organized for agriculture teachers					
3	I have a teaching load that leaves me with enough time for lesson preparation					
4	Time allocated to cover the agriculture syllabus is enough					
5	I attend workshops/seminars organized for agriculture teachers regularly					
6	I have inadequate information due to limited in-service training availed to agriculture teachers					
7	KCSE does not examine practical skills directly					
8	I have attended at least one workshop/seminar on technical help in teaching agriculture the last twelve months					
9	There is limited time allocated to cover the syllabus					

SECTION D

This section of the questionnaire will help find out the teaching approaches you use in class. For each item, please indicate with a tick (□) in one of the boxes to the right, your most appropriate response. Use the key below to choose your response. Please note that there is no correct or incorrect response.

1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree

	How much of the following do you practice as a teacher	1	2	3	4	5
1	I give facts as the most important things that students should acquire					
2	Students would describe my standards as somehow strict.					
3	I model appropriate ways for students to think about issues in the content.					
4	I spend time consulting with students on how to improve their work on projects					
5	Students usually work on projects alone with little supervision from me					
6	What I have to say about a topic is important for students to acquire a broader perspective on the issues in that area.					
7	It is my responsibility to define how students must learn					
8	I normally show students what to do in order to master the content					
9	I use small group discussions during the agriculture lesson to facilitate learning					
10	I make an effort to develop the ability of students to work independently					
11	I want students to finish the syllabus well prepared for examination in agriculture					
12	I provide very clear guidelines for how I want tasks completed in this class					
13	I use personal experiences often to illustrate points about the content					

14	I guide students' work on agriculture projects in line with the syllabus					
15	Class activities encourage students to take initiative and responsibility for their learning					
16	Lecturing is a significant part of how I teach each of the class sessions					
17	I usually give students comments on their performance					
18	I often show students how they can use various principles and concepts					
19	In my class, students take responsibility for teaching part of the class sessions					
20	In my class, students can make choices among activities in order to complete a topic					
21	There is more material in most topics than I have time available to cover it.					
22	My expectations of what I want the students to do in this class are clearly defined in the syllabus					
23	I give students a lot of encouragement to do well					
24	My interaction with the students during the teaching/learning process is very important					
25	I often assume the role of a resource person who is available to students whenever they need help					

Appendix B: Focus Group Discussion

Focus Group Discussion Guide

Introduction: I am Mary Waiganjo, a student at Egerton University pursuing Doctor of Philosophy studies in Agricultural Education. As part of my studies, I am carrying out a research study on 'Relationship between selected teacher, institutional and curriculum factors and teaching approaches used by agriculture teachers in public secondary schools in Nakuru County'. I therefore request you to take some time to participate in the study by giving your honest opinion during the agriculture teachers' discussion group. I would like to assure you that the information you provide will be treated with confidentiality and will only be used for the purpose of this study.

The following statements will be used as a guide for the agriculture teachers' focus group discussions.

1. Availability of resources for teaching agriculture in your school.
2. Acquisition for the resources needed for teaching agriculture.
3. Challenges you face in teaching agriculture.
4. Ways of overcoming the challenges faced in teaching agriculture.
5. Students' involvement in the teaching/learning process during the lesson.
6. Opinion about the agriculture syllabus
7. Teaching approach(es) normally used in teaching agriculture.
8. Reasons for preferring these teaching approaches
9. Opinion about the adequacy of the training that agriculture teachers
10. Presence and frequency of professional development activities organized for agriculture teachers
11. Opinion about the mode of assessment for agriculture subject

Appendix C: Classroom Observation

C1: Classroom Observation Guide

The following will be used as a guide to the classroom observation.

School Code: _____

Class: _____

Lesson Topic: _____

Lesson duration: _____

Date of Observation: _____

No. of learners: _____

The following classroom observation checklist will be used. The Researcher /Observer will score against each statement for every classroom observation done.

1. Not used 2. Less used 3. Mostly used

	Statements	Not Used	Less used	Mostly used
1	Teacher gives personal examples	1	2	3
2	Teacher mainly gives facts to the learners	1	2	3
3	Learners involved in active learning activities	1	2	3
4	Learners given group work	1	2	3
5	Teacher shows students what to do	1	2	3
6	Teacher makes effort to develop ability for independent working in students	1	2	3
7	Teacher provides clear guidelines for tasks to be done	1	2	3
8	Teacher uses good examples to clarify points	1	2	3
9	Active learning is favoured over passive learning	1	2	3
10	Teacher asks questions to monitor learners understanding	1	2	3
11	Teacher responds appropriately to students questions	1	2	3
12	Most learners participate in class discussions	1	2	3
13	Learners present their work in class	1	2	3

14	Learners encouraged to take initiative/responsibility for their learning	1	2	3
15	Lecturing is the most significant part of the lesson	1	2	3
16	Teacher gives learners frequent comments on their performance	1	2	3
17	Teacher shows how they can use various concepts and principles	1	2	3
18	Gives students a lot of personal support and encouragement	1	2	3
19	Interacts with the learners during the teaching/learning process	1	2	3
20	Teacher acts as a resource person during the lesson	1	2	3
21	Teacher gives feedback about correct and incorrect responses in a manner that encourages further effort	1	2	3
22	Teacher uses activities that do not involve learners	1	2	3
23	Learners manipulate materials	1	2	3
24	Teacher uses several kinds of teaching materials	1	2	3
25	Learners find information independently	1	2	3
26	Learners make use of information sources when directed by teacher	1	2	3
27	Learners follow teacher's instructions	1	2	3
28	Unquestioning transcribing of text from boards and text books by learners	1	2	3
29	Learners asks questions that show creative thinking	1	2	3
30	Teacher asks a variety of questions	1	2	3
31	Teacher uses groups and assigned roles	1	2	3

B- Map of the classroom-indicating sitting arrangement, spatial arrangement among students, teachers and materials.

C2: Classroom Observation Analysis

Table C1shows an analysis of the statements that guided the researcher during the classroom observation time. The Table shows percentages of how often an activity was Mostly used, Less used or Not used during the lesson. The researcher was a non-participant observer when the lesson was going on.

Table CI

Analysis of Classroom Observation Items

	Percentages (%)			
Activity	**Not used**	**Less used**	**Mostly used**	**TOTAL**
Teacher gives personal examples	60	40	0	100
Teacher mainly gives facts to learners	0	20	80	100
Learners involved in active learning activities	10	50	40	100
Learners given group work	80	0	20	100
Teacher shows students what to do	20	60	20	100
Teacher makes effort to develop ability for independent working in students	40	30	30	100
Teacher provides clear guidelines for tasks to be done	0	50	50	100
Teacher uses good examples to clarify points	0	20	80	100
Active learning is favored over passive learning	30	30	40	100
Teacher asks questions to monitor learners understanding	0	30	70	100
Teacher responds appropriately to student's questions	60	0	40	100
Most learners participate in class discussions	0	70	30	100
Learners present their work in class	80	0	20	100
Learners encouraged to take initiative/responsibility for their learning	20	50	30	100
Lecturing is the most significant part of the lesson	40	40	20	100
Teacher gives learners frequent comments on their performance	20	50	30	100
Teachers shows how they can use various concepts and principles	0	40	60	100

Gives students a lot of personal support and encouragement	0	50	50	100
Interacts with the learners during the teaching/learning process	0	50	50	100
Teacher act as a resource person during the lesson	0	20	80	100
Teacher gives feedback about correct and incorrect responses in a manner that encourages further effort	10	10	80	100
Teacher uses activities that do not involve learners	50	30	20	100
Learners manipulate learning materials	100	0	0	100
Teacher uses several kinds of teaching materials	50	50	0	100
Learners find information independently	40	20	40	100
Learners make use of information sources when directed by teacher	0	30	70	100
Learners follow teacher's instructions	0	10	90	100
Unquestioning transcribing of text from boards and text books by learners	20	20	60	100
Learners ask questions that show creative thinking	70	20	10	100
Teacher ask a variety of questions	10	0	90	100
Teacher uses groups and assigned roles	80	0	20	100

From the analysis done on the classroom observation of ten (10) agriculture teachers, the following is a summary of activities which scored highly among those that were not practiced in class during the lesson. Table C2 shows those activities whose occurrence was 50 percent or more.

Table C2

Activities Not Used in Class During the Observed Lesson.

Activity	**%**
Learners manipulate learning materials	100
Learners given group work	80
Learners present their work in class	80
Teacher uses groups and assigned roles	80
Learners ask questions that show creative thinking	70
Teacher gives personal examples	60

Teacher responds appropriately to student's questions	60
Teacher uses activities that do not involve learners	50
Teacher uses several kinds of teaching materials	50

From the analysis, there were activities that were mostly carried out during the lesson. The following is a list of highly common activities whose occurrence was more than 50 percent. They are arranged from the highest to the lowest.

Activity	**Percentage (%)**
Teacher ask a variety of questions	90
Learners follow teacher's instructions	90
Teacher mainly gives facts to learners	80
Teacher uses good examples to clarify points	80
Teacher act as a resource person during the lesson	80
Teacher gives feedback about correct and incorrect responses in a manner that encourages further effort	80
Learners make use of information sources when directed by teacher	70
Teacher asks questions to monitor learners understanding	70
Unquestioning transcribing of text from boards and text books by learners	60
Teachers shows how they can use various concepts and principles	60

Appendix D: Students Performance in KCSE Agriculture

Table D1

National Examination Results for Agriculture Subject (2010-2018)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
% Mean Score	33.98	37.17	34.98	33.6	41.5	44.81	30.88	27.38	30.29

Source: Kenya National Examinations Council Reports (2016), Vol 2, p67& (2019) Vol 2, p83.

Table D2

Nakuru County's Results for Agriculture Subject (2012-2016)

Year	2012	2013	2014	2015	2016	2017
% Mean Score	47.5	45.6	48.0	60.9	32.9	29.7

Source: County Education Office, Nakuru

Appendix E: Students Performance in Vocational Subjects

Table E1

Students Performance in KCSE in Vocational Subjects

	% Mean Score				
Vocational Subject	**2011**	**2012**	**2013**	**2014**	**2015**
Home Science	45.97	56.88	57.99	55.52	58.61
Art & Design	54.80	63.79	56.00	53.07	53.69
Agriculture	**37.15**	**34.85**	**33.60**	**40.50**	**44.81**
Woodwork	35.49	46.01	53.32	44.23	57.28
Metalwork	51.57	53.43	54.66	60.77	63.51
Building & Construction	39.42	42.13	56.29	53.99	55.63
Power Mechanics	56.16	65.26	66.27	71.35	69.51
Electricity	65.37	60.60	60.08	69.30	67.06
Drawing & Design	55.24	43.04	56.45	66.95	62.05
Aviation Technology	60.20	59.90	58.33	52.58	61.79
Computer Studies	57.43	57.64	55.19	56.72	55.62

Source: Kenya National Examination Council (2013) Vol 2, p xii, Kenya National Examination Council (2015) Vol 2, p xii

Appendix F: Classroom Observation Analysis

Observation checklist items were presented on a Likert scale where the observer scored each statement on a scale of 1 –not used, 2 –less used and 3-mostly used.

Descriptive Statistics

	N	Mean	Std. Deviation
Teacher gives personal examples	10	1.40	.516
Teacher mainly gives facts to learners	10	2.80	.422
Learners involved in active learning activities	10	2.30	.675
Learners given group work	10	1.40	.843
Teacher shows students what to do	10	2.00	.667
Teacher makes effort to develop ability for independent working in students	10	1.90	.876
Teacher provides clear guidelines for tasks to be done	10	2.50	.527
Teacher uses good examples to clarify points	10	2.80	.422
Active learning is favored over passive learning	10	2.10	.876
Teacher asks questions to monitor learners understanding	10	2.70	.483
Teacher responds appropriately to student's questions	10	1.80	1.033
Most learners participate in class discussions	10	2.70	.483
Learners present their work in class	10	1.40	.843
Learners encouraged to take initiative/responsibility for their learning	10	2.10	.738
Lecturing is the most significant part of the lesson	10	1.80	.789
Teacher gives learners frequent comments on their performance	10	2.10	.738
Teachers shows how they can use various concepts and principles	10	2.60	.516
Gives students a lot of personal support and encouragement	10	2.50	.527
Interacts with the learners during the teaching/learning process	10	2.50	.527
Teacher act as a resource person during the lesson	10	2.80	.422
Teacher gives feedback about correct and incorrect responses in a manner that encourages further effort	10	2.70	.675
Teacher uses activities that do not involve learners	10	1.70	.823
Learners manipulate materials	10	1.00	.000
Teacher uses several kinds of teaching materials	10	1.50	.527
Learners find information independently	10	2.00	.943
Learners make use of information sources when directed by teacher	10	2.70	.483
Learners follow teacher's instructions	10	2.90	.316
Unquestioning transcribing of text from boards and text books by learners	10	2.40	.843
Learners ask questions that show creative thinking	10	1.40	.699
Teacher ask a variety of questions	10	2.80	.632
Teacher uses groups and assigned roles	10	1.40	.843

The table presents finding from classroom observations. On average most of the Teacher provided clear guidelines for tasks to be done (Mean= 2.5, SD=0.527), gave students a lot of personal support and encouragement (Mean= 2.5, SD=0.527), interacted with the learners during the teaching/learning process (Mean= 2.5, SD=0.527) as well as showed how they can use various concepts and principles (Mean= 2.60, SD=0.516). Majority of the teachers mostly used techniques of asking questions to monitor learners understanding (Mean= 2.70, SD=0.483), giving feedback about correct and incorrect responses in a manner that encourages further effort (Mean= 2.70, SD=0.675), giving facts to learners (Mean= 2.80, SD=0.422), using good examples to clarify points (Mean= 2.80, SD=0.422) and acting as a resource person during the lesson (Mean= 2.8, SD=0.422). They also mostly used variety of questions (Mean= 2.80, SD=0.632). Learners on the other hand mostly followed teacher's instructions (Mean= 2.9, SD=0.316), participated in class discussions (Mean= 2.7, SD=0.83) as well as made use of information sources when directed by teacher (Mean= 2.7, SD=0.483).

However, teachers had less use of several kinds of teaching materials (Mean= 1.5, SD=0.527), less use of lecturing teaching approach (Mean= 1.8, SD=0.789), less effort to develop ability for independent working in students (Mean= 1.9, SD=0.876) as well as giving learners frequent comments on their performance (Mean= 2.1, SD=0.738). There was also less use of appropriate response to student's questions (Mean= 1.8, SD=0.1.033). Learners on the other hand had less habit of finding information independently, they were less encouraged to take initiative/responsibility for their learning (Mean= 1.8, SD=0.1.033), less involved in active learning activities (Mean= 2.0, SD=0.943) and had less questioning transcribing of text from boards and text books (Mean= 2.4, SD=0.843).

It was also observed that there was no use of teacher's personal examples (Mean= 1.4, SD=0.516) and teachers using groups and assigning roles (Mean= 1.4, SD=0.843). Learners neither manipulated materials (Mean= 1.0, SD=0.0) nor presented their work in class (Mean= 1.4, SD=0.843). They did not also ask questions that show creative thinking (Mean= 1.4, SD=0.699).

Appendix G: Analysis of Focus Group Discussions

Three focus group discussions were conducted for this study. The purpose was to get an in-depth understanding of the variables being studied. The first focus group was comprised of seven (7) agriculture teachers drawn from Nakuru North and Rongai sub-counties, the second focus group had (7) participants drawn from Nakuru East and Nakuru West sub-counties. The third focus group had (10) all from Naivasha sub-county. For each of the focus group, the participants were recruited based on their willingness to be involved. A date of meeting and venue were agreed upon and phone calls were made to the participants to confirm their willingness and availability and as a reminder of the meeting when the meeting day was due.

The main purpose of conducting the focus group discussion was to get a better understanding of why agriculture teachers use the teaching approaches that they do in teaching agriculture. Data obtained from the focus group discussions were analysed using the group as the unit for analysis. The information was then categorized into general themes that helped to summarize data in line with the objectives of the study. The general themes identified and used to summarize data collected from the focus groups were; challenges faced by agriculture teachers, teaching workload, class size, school farm, school library, school administration's support, PDA, agriculture syllabus and KCSE agriculture examination. The three focus group discussions were synthesized and data combined under the general themes. The following is a summary of what was synthesized from the focus group discussions

Theme 1: Challenges faced by agriculture teachers. The discussions began by asking them to state their challenges in teaching agriculture. The challenges that were shared were lack of enough resources, large class sizes especially due to the 100 percent primary to secondary school transition, high teaching workloads.

Theme 2: Teaching workload for agriculture teachers. Some teachers talked of high teaching workload and especially where the teacher is the only agriculture teacher in the school. A high workload is considered to be more than 27 lessons per week. However, the teachers claim that though the discussion was around the number of lessons that appear on the official timetable, it is a common practice for secondary school teachers to have remedial lessons which are taught outside the official class time. He implications for this is that the agriculture teachers are having a higher teaching workload than is stated on the official timetable. The teachers confessed that this is affecting the way they teach since a high workload reduces the lesson preparation time and hence they tend to use the easiest teaching approaches to prepare for.

Theme 3: Class size. Most of the agriculture teachers admitted to having large class sizes of even more than 100 students per class. Some had a moderate class size of about 40-50 students while only a few had a very small class or had to talk to students to recruit them into the agriculture class. According to the agriculture teachers, this has implications for teaching. Those whose class sizes were large had the following to share, it means that the classes are overcrowded and thus no room for students to adequately move to perform certain activities like working in groups. Teachers moving about freely in such a class is difficult and as they would say "it becomes difficult sometimes to control the class". A large class size means that it is difficult for learners to share the limited resources available and most teachers said that, that is one of the reasons why they hardly use teaching resources and when they do, they only demonstrate instead of having the learners manipulate them.

Theme 4: School farm. Most of the teachers shared that they have a school farm but admitted that they hardly use it for teaching purposes. The main student activity in the school farm according to the agriculture teachers is the Form 4 agriculture project which is a KNEC activity. Only a few admitted to not having space in the school farm where they can carry out teaching activities related to agriculture.

Theme 5: School library. When asked whether the school has a school library, most agriculture teachers admitted to having a 'school library' but the publications found there do not qualify it to be an actual library. Some said that the school library acts as a book store where the textbooks to be distributed to the students are kept, or it is used as a store for the outdated textbooks especially from the previous education system. Others said that some book donations are outdated and therefore not very useful for students use. Only a few admitted to having a functional library and even then, the materials reading provided are few and may not be very relevant to agriculture content. All admitted that the school libraries are not equipped with e-materials that students can interact with for academic purposes.

When asked whether the students visit the school library to read or borrow books, most said that the students have limited time to make use of the library.

Theme 6: School administration's support. When asked about the support they get from the school administration, most were in agreement that they get support especially for acquiring teaching resources. However, most reported that support for the use of field trips is not easily given. They alluded to the fact that the school administration makes it difficult for them to use field trips by asking the students to cater for the trip financially to which some of the students may be locked out. The administration may also require the students to clear their fees first before they

go for the trip. A few teachers stated that they are asked to plan for the trips on Saturday or Sunday which makes it difficult since most areas of interest are open Monday to Friday.

When asked about starting agriculture projects in school, some were in agreement that the school administration readily supports them while others said that the support is not readily forthcoming. The limited support by the administration has made most agriculture teachers lose interest in establishing agriculture projects in school.

Theme 7: School's daily schedule: When discussing about the school daily schedule, the main focus was to find out the flexibility the agriculture teachers have in continuing with learning activities out of the scheduled lesson time. This is important especially in using the agriculture projects as a teaching activity. Most admitted that the school schedule is too tight to allow the students to attend to their projects a fact that discourages the teachers from using project-based learning. The tight school schedule also limits the time available for students to make good use of the library which limits the teacher's use of the library as a resource where students can source for information on topics of interest in agriculture.

Theme 8: Professional Development Activities. Discussions were held around seminars and workshops organized for agriculture teachers. Some agreed hat they have attended a seminar or workshop organized for agriculture teachers twelve months prior to these discussions. A few said that it has been long since they attended one and only very few of them said that they have never attended any. On further questioning, the teachers cited various reasons for the low attendance in such forums ranging from the fact few PDA are organized for agriculture teachers, the school heads are unwilling to let them go and hence the information about the workshops or seminars is kept from them. In fact, some said that they get the information about PDA from their peers on social media and not from their school Principal and even them permission to attend is not readily granted. Since the agriculture teachers also teach biology, they compared the two subjects and all were in consensus that there is a bias in the frequency of PDA for various subjects. According to them, they tend to feel that some subjects are deemed more important than others.

Theme 9: Agriculture syllabus: The main focus when discussing the syllabus to get the teachers' perspectives about the time allocated to cover the syllabus. Some said that the time allocated is enough to cover the syllabus while some said that as much as they cover the syllabus within the stipulated time, they have to rush through it. In their own admission, many said that they have to get ways of finishing the syllabus on time. A few said the syllabus is wide and they struggle to finish. To this end some said that they use teaching approaches that will allow them to cover the syllabus in time and more so since the head of department who monitors the progress of every teacher.

Theme 10: KCSE agriculture examination: The discussion around the mode of assessment wash to find out if there is any wash back effect, that is, effects of examinations on how the teachers teach agriculture. Most of the agriculture teachers stated that the fact that there is no practical examination for agriculture, they do not put a lot of emphasis on practical learning activities. A few participants who have taught agriculture for many years said that their teaching approaches have changed over time from when the students used to be subjected to practical examinations to the present situation after this mode of assessment was phased out.

Appendix H: Request for Research Permit

EGERTON
Tel: Pilot: 254-51-2217620
254-51-2217877
254-51-2217631
Dir.line/Fax: 254-51-2217847
Cell Phone

UNIVERSITY
P.O. Box 536 - 20115
Egerton, Njoro, Kenya
Email: bpgs@egerton.ac.ke
www.egerton.ac.ke

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref: ED11/14605/15 Date: 30th October, 2018

The Director General
National Commission for Science Technology and Innovation,
P. O. Box 30623-00100
NAIROBI.

Dear Sir,

RE: REQUEST FOR RESEARCH PERMIT – MS. MARY MWIHAKI WAIGANJO REG. NO. ED11/14605/15

This is to introduce and confirm to you that the above named student is in the Department of Agricultural Education and Extension, Faculty of Education and Community Studies, Egerton University.

She is a bona-fide registered PhD student in this University. Her research topic is **"Influence of Selected Teacher, Institutional and Curriculum Related Factors on Choice of Teaching Approaches Among Agriculture Subject Teachers in Public Secondary Schools in Nakuru County, Kenya"**

She is at the stage of collecting field data. Please issue her with a research permit to enable her undertake the studies.

Your kind assistance to her will be highly appreciated.

Yours faithfully,

DIRECTOR, BOARD OF POST GRADUATE STUDIES
02 NOV 2018
EGERTON UNIVERSITY, P.O. Box 536-20115 EGERTON

Prof. Nzula Kitaka
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

NK/vk

Appendix I: Research Authorization

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471, 2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/19/18852/27663**

Date: **15th January, 2019**

Mary Mwihaki Waiganjo
Egerton University
P.O. Box 536-20115
NJORO

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Influence of selected teacher, institutional and curriculum-related factors on choice of teaching approaches among agriculture subject teachers in public secondary schools in Nakuru County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending **14th January, 2020.**

You are advised to report to **the County Commissioner and the County Director of Education, Nakuru County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nakuru County.

The County Director of Education
Nakuru County.

Appendix J: Research Permit

THIS IS TO CERTIFY THAT:
MS. MARY MWIHAKI WAIGANJO
of EGERTON UNIVERSITY, 12513-20100
Nakuru,has been permitted to conduct
research in *Nakuru County*

Permit No : NACOSTI/P/19/18852/27663
Date Of Issue : 15th January,2019
Fee Recieved :Ksh 1000

on the topic: *INFLUENCE OF SELECTED TEACHER, INSTITUTIONAL AND CURRICULUM-RELATED FACTORS ON CHOICE OF TEACHING APPROACHES AMONG AGRICULTURE SUBJECT TEACHERS IN PUBLIC SECONDARY SCHOOLS IN NAKURU COUNTY, KENYA*

for the period ending:
14th January,2020

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

Appendix K: Ministry of Education Authorization

MINISTRY OF EDUCATION

STATE DEPARTMENT OF EARLY LEARNING OF BASIC EDUCATION

Telegrams: "EDUCATION",
Telephone: **051-2216917**
When replying please quote
Email:cdenakurucounty@gmail.com
Ref.CDE/NKU/GEN/4/1/21 VOL.VIX/32

COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY
P. O. BOX 259,
NAKURU.

22nd January, 2019

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION –MARY MWIHAKI WAIGANJO
PERMIT NO. NACOSTI/P/19/18852/27663

Reference is made to letter NACOSTI/P/**19/18852/27663**
dated **15th January,2019.**

Authority is hereby granted to the above named to carry out research on ***"Influence of selected teacher, institutional and curriculum-related factors on choice of teaching approaches among agriculture subject teachers in public secondary schools in Nakuru County, Kenya."*** for a period ending **14th January, 2020.**

Kindly accord her the necessary assistance.

For: COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY

JOYCE SANKOK
FOR: COUNTY DIRECTOR OF EDUCATION
NAKURU

Copy to:

- Egerton University
  P.O Box 536-20115
  NJORO

Appendix L: Nakuru County Commissioner's Authorization

OFFICE OF THE PRESIDENT
MINISTRY OF INTERIOR AND
CO-ORDINATION OF NATIONAL GOVERNMENT

Telegrams:" DISTRICTER", Nakuru
Telephone: Nakuru 051-2212515
When replying please quote

COUNTY COMMISSIONER
NAKURU COUNTY
P.O. BOX 81
NAKURU

Ref. No. ***CC.SR.EDU 12/1/2 VOL.II(21)*** **23rd January 2019**

TO WHOM IT MAY CONCERN

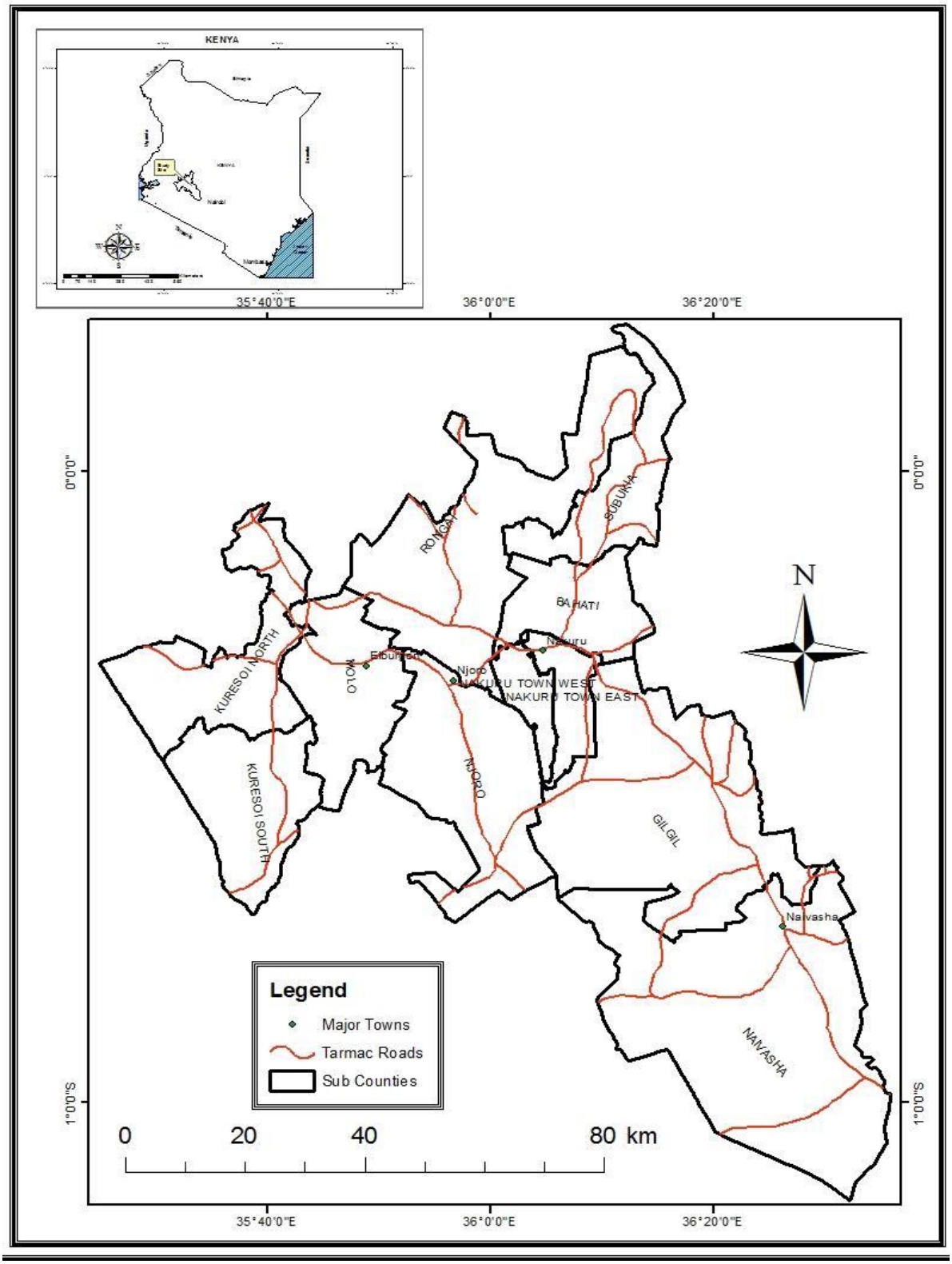
RE: RESEARCH AUTHORIZATION – MARY MWIHAKI WAIGANJO

The above named student has been given permission to carryout research on ***"Influence of selected teacher, institutional and curriculum-related factors on choice of teaching approaches among agriculture subject teachers in public secondary schools in Nakuru County, Kenya"*** for the period ending **14th January 2020.**

Kindly give her all the necessary support to facilitate the success of her research.

JOHN KICHWEN
FOR: COUNTY COMMISSIONER
NAKURU COUNTY

Appendix M: Map of Nakuru County Showing the Sub-Counties



Appendix N: Publications

International Journal of Innovation and Research in Educational Sciences
Volume 6, Issue 6, ISSN (Online) : 2349–5219

Status and Significance of Professional Development for Agriculture Teachers in Nakuru County, Kenya: A Teachers' Perspective

Mary M. Waiganjo [1*], Maurice O. Udoto [2] and Patricia W. Wambugu [3]
[1, 2] Department of Agricultural Education and Extension, Egerton University, Egerton, Kenya.
[3] Department of Curriculum Instruction and Education Management, Egerton University, Egerton, Kenya.
*Corresponding author email id: [illegible]

Date of publication (dd/mm/yyyy): [illegible]

Abstract – A nation is made great by its teachers as they educate the future generation. A nation may have, equipped schools with up to date facilities and resources and an excellent curriculum that has the potential to meet the needs of the society but, if the teacher is not well prepared to implement the curriculum, the whole programme is likely to be ineffective and a waste. Professional development for teachers is a structured professional learning that seeks to develop teacher practices and improve students learning outcomes. Professional development for teachers is therefore a necessary curriculum development activity that needs to be given the attention it deserves. A survey done in Nakuru County sought to find out the agriculture teachers' views about professional development activities organized for them. The survey utilized three instruments namely; Agriculture teachers' questionnaire, Agriculture teachers' Focus groups and classroom observation guide to collect data. The Cronbach's coefficient for the Agriculture teachers' questionnaire was 0.782. A sample size of 132 agriculture teachers were the respondents to the Agriculture teachers' questionnaire, three focus group discussions were conducted and ten classroom observations done. The findings of the study were that, though agriculture teachers face numerous challenges in teaching the subject, professional development activities for agriculture teachers are insufficient. Some of the challenges the agriculture teachers face include, large class sizes, lack of adequate resources, special needs students in class, high teaching workload and increased diversity among the students to which the agriculture teachers are often unsure of how to handle them correctly. The agriculture teachers also expressed a desire to have regular professional development forums where they can share their experiences as well as learn from experts and peers. Recommendations made from the findings of the study is that, there is need to have a deliberate effort right from the policy formulation level to implementation in having professional development for agriculture teachers being purposeful and continuous. The government should therefore consider allocating more funds towards professional development for teachers so that professional learning can be more regularly availed to agriculture teachers. This is pertinent as Kenya implements the competency-based curriculum, the 100 percent primary to secondary transition policy as well as working towards achieving the Sustainable development goals.

Keywords – Professional Development, Agriculture Teachers, Teaching Effectiveness.

I. Introduction

As one of the Sub-Saharan Countries, Kenya's agricultural potential include the ability to alleviate poverty, increase food security, create employment and raise the income of the agrarian community (Ngugi, Isinika, Temu & Kitalyi, 2002). One of the big-four agenda for Kenya is improving the level of food security. One way of releasing the potential in agriculture in dealing with such issues is by offering quality education in schools which research has shown that there is a positive correlation between secondary school agricultural education and farming productivity (Yasmeen, Abbasain & Hussain, 2011; Kigkemoi, Kigen, Sulo, Korir, & Inyanje, 2012). According to policy document by Kenya government, agricultural productivity has a direct impact on economic growth (Republic of Kenya, 2005). One factor that contributes significantly to quality of education and the success of any curriculum is teacher effectiveness. The question to ask is whether students can learn if the teacher is not

Implications of Class Size in Teaching Agriculture in Secondary Schools: Kenya's Challenge in Implementing Competency-Based Curriculum

Mary M. Waiganjo, Patricia W. Wambugu, and Maurice O. Udoto

ABSTRACT

Class size is an important consideration in classroom teaching as it influences choice of classroom activities. Classroom activities, define how a teacher interacts with learners and are key in determining the quality of learning. Class size has increased over time in Kenya due to an increase in population and the implementation of educational reforms geared towards ensuring that all children acquire basic education. The students' performance in agriculture at national examinations has been of concern prompting research to find out the reasons why. This study sort to find out the status of class size in agriculture lessons in Kenyan secondary schools and its implications in the implementation of the agriculture curriculum. A survey involving 151 agriculture teachers was done and data collected using questionnaires, focus group discussions and classroom observations. Data was analyzed using descriptive statistics. The findings of the study were that, the increasing class size has forced agriculture teachers to lean more towards teacher-centered teaching approaches which do not enable learners to acquire the requisite competencies. As Kenya implements the Competency-Based Curriculum, it is prudent to consider class size as one of the factors that will determine the success of the timely educational reforms.

Key words: Class size, Competency-Based Curriculum, agriculture, secondary school

Contact author: Mary M. Waiganjo Department of Agricultural Education & Extension, Egerton University.

INTRODUCTION

In Kenya, agriculture as a learning area is intended to enhance relevant basic agricultural skills development for food security and career advancement (Konyango &Asienyo, 2015). The objectives of teaching any subject indicate the behaviour change expected of students whose achievement can be assessed through the use of examinations. The yearly report from the Kenya National Examinations Council (KNEC) (2019) indicates that

1. **Mary M. Waiganjo,** Maurice O. Udoto, & Patricia W. Wambugu, (2019). Status and Significance of Professional Development for Agriculture Teachers in Nakuru County, Kenya: A Teachers' Perspective. *International Journal of Innovations and Research in Educational Sciences (IJIRES), 6(6), 774-781.*
   http://www.ijires.org/administrator/components/com_jresearch/files/publications/IJIRES_1645_FINAL.pdf
2. **Waiganjo, Mary, M**., Wambugu, Patricia, W. & Udoto Maurice O. (2020). Implications of Class Size in Teaching Agriculture in Secondary Schools: Kenya's Challenge in Implementing Competency-Based Curriculum*, Journal of African Studies in Educational Management and Leadership Vol: 12, 2020, p24-40.*
   http://www.kaeam.or.ke/vol12/implications-of-class-size-in-teaching-agriculture-in-secondary-schools-kenya-s-challenge-in-implementing-competency-based-curriculum.html