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AN INVESTIGATION OF THE TEACHER PREPAREDNESS IN THE IMPLEMENTATION OF THE COMPETENCE-BASED AGRICULTURE SUBJECT CURRICULUM AT JUNIOR SECONDARY SCHOOLS IN KENYA

Research article

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Abstract

Curriculum review and change are occasioned by the need to keep learners abreast with the pertinent issues. In Kenya, the change in curriculum from the 8-4-4 to the current 2-6-3-3-3 comes with many changes that the teachers need to embrace. Since Agriculture is considered as a core subject at the junior secondary level, this study sought to establish teachers' preparedness in implementing the Agriculture subject curriculum. A desktop research design was adopted for this study which relied on data from relevant sources related to CBC. The main emphasis was on teacher preparedness in terms of subject matter, utilization of the school farm, mode of assessment, and ICT integration in the teaching of competence-based Agriculture. This study established that agriculture teachers being the agriculture subject curriculum implementers, their preparedness in terms of knowledge of the subject matter, ICT integration in teaching, mode of assessment and utilization of the school farm in teaching is poor. It was therefore concluded that most agriculture teachers at junior secondary schools are not well prepared for the implementation of an agriculture subject curriculum. This study therefore recommended that the Government of Kenya should provide more in-service training to agriculture teachers at junior secondary to make them more prepared to effectively implement agriculture subject curriculum.

Keywords: Teacher preparedness; competence based curriculum; agriculture subject; junior secondary school

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1. Introduction

1.1. Introduction

Education is considered one of the best possible means of achieving social and economic changes and concerning this, Momanyi and Rop, (2020) argue that curricula should be aligned to the emerging needs of the society. Current global changes such as technological advancement coupled with the globalization of the labor market have necessitated the need for the acquisition of 21st century skills which according to Waweru (2018) has brought about significant curricular changes worldwide. Skill acquisition requires a type of education system that prioritizes learner-centered approaches. A competency-based Based Curriculum (CBC) is considered the ultimate panacea to this as Sifuna and Obonyo (2019) point out that it develops and nurtures relevant skills to the learners which places them in a better position to favorably compete in the labor market. CBC has also been lauded for its ability to give learners ample time to move at their own pace which is necessary for the mastery of desired competencies.

The curriculum change process is complex and dynamic and its success is hinged on well envisaged preparations of various stakeholders; teachers inclusive. Comparative studies reveal that the countries that have successfully rolled out and implemented the CBC are known to have first undergone adequate preparation in terms of teacher preparation, resource provision, and effective piloting. Russia for instance has achieved CBE which (Moiseenko et al. 2020)attribute to a high degree of preparedness in terms of teacher training and the provision of excellent learning facilities. In Africa, Rwanda is among the countries that have successfully implemented CBC since the year 2016 where the cascade model was employed in retooling the teachers to make them adequately prepared to teach CBC learning areas and subjects (Nsengimana, 2021). According to the World Bank (2015), Tanzania introduced the CBC in the year 2005. However, nine years later, studies carried out by (Mwang'ombe, 2021), indicated that there was still a great mismatch between what the CBC advocates for and what was being implemented.

In Kenya, the rolling out of the competency-based curriculum commenced in the year 2015 at pre-primary and in 2017 at primary school. Prior studies raised concern about the unpreparedness of teachers both in lower and upper primary to the implementation of the new curriculum. Specifically, in agriculture subjects, prior studies noted teacher's lack of knowledge in subject matter, assessment and teaching methodologies in CBC, and inadequate in-service training of agriculture teachers on the implementation of CBC among other areas (Karani, Miriam, and Mironga 2021; Karani, Miriam, and Ng'eno 2022). In addition, a study by Ndambuki, Kyule, and Konyango (2024) found out agriculture teachers at upper primary could not make use of the 4-K agriculture youth club activities both in school farm and in the community to help learners acquire the needed competencies in agriculture subject. Generally, previous research noted a below-average teacher preparedness for the implementation of a

competency-based agriculture subject curriculum. In November 2022, the first cohort of students sat for the KPSEA exams and proceeded to Junior Secondary Schools in February 2023. A report by presidential working party formed in December 2022 recommended junior secondary schools be retained in primary schools rather than being hosted in secondary schools (Republic of Kenya, 2023). It also suggested for deployment and employment of teachers at junior secondary to teach various subjects and learning areas which learners should undertake including agriculture subject. in addition, teaching agriculture subject at junior secondary school requires teachers who are adequately trained to acquire knowledge on ways of implementing the practical competency-based agriculture subject curriculum. It is perceived that the Competency-Based Curriculum was politically rolled out and imposed on unprepared tutors which according to Wanzala (2018) has resulted in discontent from teachers as well as the teacher unions. This study therefore sought to investigate teacher preparedness in the implementation of competence-based Agriculture curriculum at junior secondary schools in Kenyan schools.

1.2 Relevant scholarship

1.2.1 Position of Agriculture in the Competency-Based Curriculum in Kenya

Food insecurity, pollution, decline in soil fertility, and climate change are some of the pertinent global issues related to Agriculture that need to be solved. Tackling these issues calls for a skillful workforce. Problem-solving, imagination, digital literacy and creativity are some of the competencies that the CBC aims to instill into the learners which according to Ajuoga and Keta (2021) can help in solving some of the 21st-century challenges.

CBC has been structured into three phases comprising of; Early Year Education which covers Pre-Primary Education up to Grade 3; Middle School Education, which covers Grade 4 to Grade 9; and Senior School Education, which covers grades 10 to Grade 12. Early Childhood Education (ECDE) has also been prioritized in CBC where the learners will have to spend two years in ECD centers before transiting to primary schools. *Figure 1* is a graphic representation of the new educational structure:

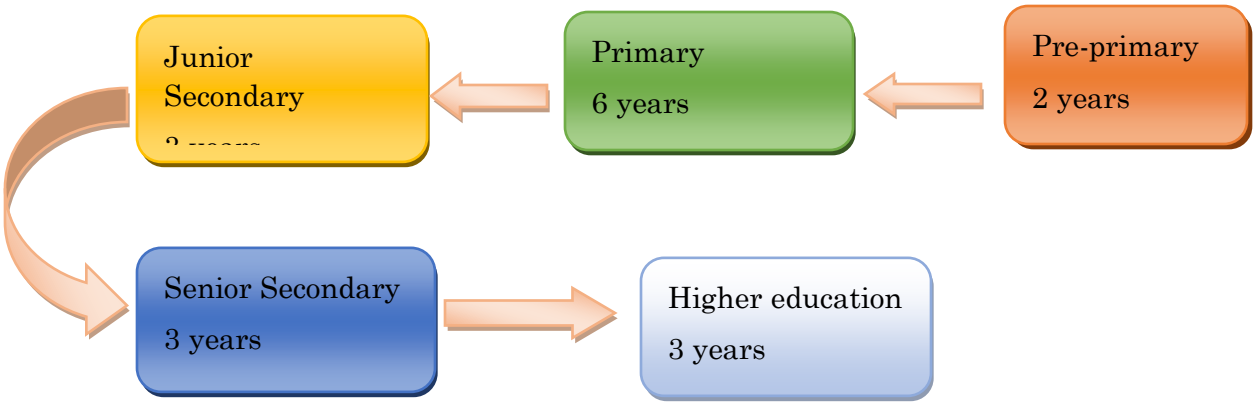

Figure 1: *Basic Education model of Kenya's new educational curriculum*
Source: Researcher

Unlike the 8-4-4 system, CBC has given special consideration to Agriculture subject owing to the contribution of the agriculture sector to the Kenyan economy. In the 8-4-4 system of education, Agriculture had been integrated with the Science curriculum at the primary school level while at the secondary school level, the subject had been made optional (KIE 2006). However, in the CBC, Agriculture has been made to be a core subject at the upper primary school level as well as the junior secondary school level (RoK, 2017). At the senior secondary school level which covers grades 10 to 12, there are three learning pathways which include; Arts and Sports Science, Social Sciences and Science Technology and Engineering (STEM). Agriculture has been placed in the STEM pathway among the applied sciences. This will place the learners in a better position to further their studies in agriculture-related fields upon completing their Senior Secondary education (KICD 2016).

1.2.2 Teachers' Subject Matter Content

Teachers' significance in education cannot be underestimated. This can be attributed to the fact that Kyule (2017) points out that successful curriculum implementation entirely depends on the availability of adequate well-qualified teachers. The teacher is the major player in the implementation of any curriculum thus the success or failure of any school curriculum depends on the teacher as the curriculum implementer (Aslam et al. 2016). The teacher as a facilitator in the learning process has to create conditions that allow the learning process more effective and efficient (Anisah & Widyantoro,2019). Organization, utilization and improvisation of all the other resources during the instructional process are entirely reserved to the teacher. The role of the teacher in Agriculture which is considered a resource-intensive subject cannot be overlooked.

The need to have competent educators capable of imparting desirable attitudes, knowledge and skills among the learners is a central concern for all educational policymakers

globally (Ye, Zhu, and Lo 2019). Chemutai (2020) describes a competent teacher as one who has a positive effect on student learning and development through a combination of content mastery, command of a broad set of pedagogical skills, and communications/interpersonal skills all of which are crucial in the implementation of a CBC. In developed countries such as Luxembourg, teacher qualification has been given much consideration whereas according to Karani et al. (2021), besides certification, a teacher must be subjected to state examinations before employment. The United Nations Educational Scientific and Cultural Organization pressed ahead and sponsored a conference on the development of education in Africa at Addis Ababa (UNESCO, 2006). One of the main recommendations of this conference was to increase facilities for training and teaching to equip future teachers with the relevant skills and knowledge on how to use and improvise resources during the actual teaching process. The actual implementation of this report up to date however remains debatable in most African countries. Chonjo, (2018) observed that in Tanzania for instance, CBC implementation has stagnated due to unqualified teachers.

In Kenya, the policy of employing qualified and trained teachers in Agriculture dates back to the inception of the subject during the Chavakali pilot project. During this time, (GoK, (2017) report indicate that the training and posting of Agriculture teachers was fully funded by the government. With the introduction of the 8-4-4 system of education, technical subjects like Agriculture became compulsory which led to a high demand for teachers thus (Recha, Kyule, and Nkatha, 2024) observes that unqualified teachers were recruited to teach Agriculture. Diploma colleges were allowed to offer training to Agriculture teachers irrespective of whether they had relevant teaching resources and facilities which according to Saeteurn (2017) gave a lee-way for the employment of semi-skilled teachers. With CBC having been rolled out in 2018, it would be imperative to determine the level of teacher preparedness in terms of subject matter content which is deemed crucial in the implementation of the practical aspects of Agriculture which forms the main basis of the CBC.

1.2.3 Teacher preparedness in the integration of Information Communication Technology

Digitalization in education is rapidly gaining mileage and thus the integration of Information and Communication Technology (ICT) in education is inevitable. According to Ejinkeonye and Usoroh, (2016), ICT is a set of instruments for producing, storing, processing, distributing and exchanging data. ICT is a wide subject that encompasses the utilization of television and radio as well as newer technologies such as computers and other devices, software applications and connectivity such as internet, local networking, infrastructure and video conferencing. There are also systematic processes that have to do with various ICT tools which consist of floppy disks, DVDs, flash disks, CD ROM, scanner hardware and other software. According to Kofo and Mercy, (2018), ICT tools are student-centered and when

integrated into the instruction process, they open up opportunities for information seeking as well as facilitate development through interaction with the use of other technologies such as cell phones.

Developed countries have given priority to ICT adoption, integration and implementation in education because of its potential to improve and enhance teaching and learning. In the United Kingdom for instance, the government expenditure on ICT in schools was approximately 2.5 billion pounds based on the financial report for the year 2008-2009 (Lawrence and Tar 2018). According to Salam et al. (2017), the education system of such countries acknowledges that the traditional educational environments do not seem most appropriate for meeting the needs of 21st-century learners who respond very well to ICT integration during the teaching-learning process. Despite attempts by African governments to invest in ICT resources in schools to improve education standards, past research by Akpabio and Ogiriki, (2017) reveals that the full integration of ICT in the learning institutions in most African countries is still far from reality mainly due to such factors like lack of technical know-how from the teachers and poor internet connectivity in most rural schools. Huge educational investments have produced little evidence of ICT integration in the majority of African countries (Akpabio & Ogiriki, 2017; Muchiri, 2018).

Unlike the 8-4-4 system, CBC tends to give special consideration to ICT integration. As outlined in the Agriculture grade 8 learner's book authored by Ngunyu (2023), one of the objectives of teaching Agriculture at the Junior Secondary School level is to enable the learner to apply existing and emerging technology in agriculture, digital and media resources to enhance sustainable agricultural practices. To achieve this objective, there are suggested learning activities at the start of each topic requiring the teacher to guide learners through the specified agricultural practices by use of digital devices such as computers. Besides these suggested learning activities, there is an entire topic on agriculture and technology in both grades 7 and 8. In grade 7, this topic entails exposing learners to the use of modern farming methods and value-addition techniques. In grade 8, the topic exposes learners to the use of ICT in accessing agriculture support services such as extension, weather forecast, banking, veterinary services and market information. Nyaboke et al. (2021) deem this type of interactive learning as appropriate for preparing learners for future agriculture-related careers. It would however be imperative to establish the level to which the teachers who are expected to implement these activities are prepared to integrate ICT during the instructional process.

1.2.4 Teacher Preparedness on the Use of the School Farm

The school farm is arguably the most vital facility required in the practical teaching of Agriculture. Konyango and Asienyo (2015) argue that the school farm is of great relevance during Agriculture lessons as the laboratory is for science subjects such as Biology, Chemistry and Physics. Iderawumi et al. (2021) defined the school farm as a selected plot of

land in the school environment where students carry out practical agriculture both in crop production and animal husbandry. According to Karani (2021), an ideal school farm for the teaching and learning of Agriculture should have four mandatory sections which include; demonstration plots, commercial plots, museum plots and project plots. Iderawumi (2020) outlined the objectives of a functional school farm to include; earning income for the school through the sale of surplus produce, attraction centre to school visitors, providing farming practice to the learners, improving background knowledge, solving individual farming problems and Carrying out experimentations. With all these outlined objectives, it can be conclusively judged that the school farm is one of the prerequisites for effective implementation of the Agriculture curriculum.

FAO promotes the use of school farms mainly to enhance experiential learning as well as improve the nutrition status of students and teachers (Machisu et al., 2022). The school farm facility also offers farming experience to pupils without agricultural background which according to Chukwudum and Ogbuehi (2013) arouses their interest in Agriculture. Such experiential learning provides a form of non-formal education that prepares future farmers beyond the classroom. According to Waiganjo and Waweru (2018), students engaged in farm education gain exposure to direct learning experiences that equip them with farming practices about crop and livestock production. Utilization of the school farm impacts skills such as teamwork, critical thinking, problem-solving, communication and cooperation among learners which are deemed as the 21st-century skills that the CBC aims to instill into the learners.

A study by Onwumere et al. (2016) on the influence of school farms on the teaching of agricultural sciences established that farms have a positive influence on the teaching of the subject since Agriculture teachers have high regard for the farms in the first place. Research findings by Njura et al. (2020) showed an increased level of cognitive and affective components of learning through the inclusion of instructional hands-on activities on school farms in comparison to control group participants without hands-on experience. Well-designed school farm curricula ensure that students are allowed to flex their entrepreneurial prowess through practical exercise. Agribusiness is on the rise from the preparation of fields to planting to marketing and processing of agricultural products. School farms serve as the platform for students to gain the ability to independently manage and control farm affairs which is a basic attribute of entrepreneurs. School farms provide students with supervised occupational experience in agricultural productivity as well as encourage record-keeping among students which tends to prepare students for agriculture-related occupations (Aholi, 2018).

1.2.5 Teacher Preparedness in Mode of Assessment in the CBC

Assessment is a crucial component of the teaching-learning process as it helps the teacher to provide feedback to the students. Furthermore, assessment enables the teacher to determine whether the set objectives have been achieved or not. The previous 8-4-4 system

relied on summative evaluation whereby a student's final grade was determined by two standardized national examinations administered by the Kenya National Examinations Council (KNEC). After eight years of primary education, a learner was subjected to the Kenya Certificate of Primary Education examination. The exam comprised five subjects namely; English (Composition and Grammar), Kiswahili (Insha and Lugha), Science, Mathematics, Social Studies and Religion. The maximum score was 500 marks. The score attained by the learner at this level greatly dictated the school category to which the learner would be eligible to join for secondary education.

At the end of secondary education, the learners were subjected to the Kenya Certificate of Secondary Education (KCSE); another examination administered by the KNEC. At this level, based on the KNEC requirements, a learner was required to sit for 8 subjects. Only Mathematics, English and Kiswahili were compulsory. The grouping and selection criteria of the various subjects vary among schools. The KCSE grade ranged from A to E. The grade attained by a learner at this level determines the type of tertiary institution and course to pursue. The tests administered by the KNEC were norm-referenced as they were designed to yield a normal distribution curve. Ranking of schools and students based on performance was also highly prioritized which according to Kaviti (2018) significantly contributed to a myriad of examination malpractices.

One of the most significant changes between CBC and the previous 8-4-4 system in terms of assessment is that the CBC places greater emphasis on formative evaluation whereby the teacher administers Continuous Assessment Tests (CATs) and progressively keeps a record of a student's performance which finally determine the learners score at the end of the academic year. Furthermore, KICD (2020) report reveals that the tests administered under the 2-6-3-3-3 system will be criterion-referenced in the essence that focus will be placed on an individual student's capability to perform a prescribed task. Ranking of schools and students based on academic performance will also be overhauled which can perhaps serve as a possible panacea to the excessive exam malpractices that had festered under the previous system. The new mode of assessment will however have a burden implication on the teachers since they will be required to constantly monitor, keep and upload students' progressive records. Since Agriculture as a vocational subject entails both classroom and field activities, it will be more demanding for the teacher to co-ordinate class work, field projects on the school farm and continuous assessments. It was therefore imperative to determine the Agriculture teachers' level of preparedness in assessing students in the CBC.

1.3 Implications of the study

This study is important in that it will inform the Government of Kenya on how agriculture teachers at junior secondary schools are prepared to implement the competency-based agriculture subject curriculum. This will help to identify the areas in which agriculture

teachers are not well-prepared therefore forming the basis for relevant action. This study informed on the level to which agriculture teachers at junior secondary are conversant with the agriculture subject content. The study also gives an insight on the level to which agriculture teachers use school farms and integrate ICT facilities in teaching agriculture subject at junior secondary to help learners acquire core competencies. This informs the Ministry of Education on gaps in teachers' use of ICT tools and school farms in teaching agriculture subject hence informing on teacher-related areas which require improvement.

1.4 Research questions

This study sought to answer the following research questions to address the problem under study;

i. How are the agriculture teachers prepared in terms of knowledge of the subject matter content of the agriculture subject at junior secondary school in Kenya?
ii. How are agriculture teachers prepared for the integration of Information Communication Technology (ICT) in teaching agriculture subject at junior secondary school in Kenya?
iii. How are agriculture teachers prepared for the use of the school farm in teaching agriculture subject at junior secondary school in Kenya?
iv. How are agriculture teachers prepared to use mode of the assessment in the competency-based agriculture subject at junior secondary school in Kenya?

2. Theoretical analysis

This study was anchored on two theories. The first theory was the updated Bloom's Taxonomy of Learning which was postulated by Benjamin Bloom. This theory holds that learning skills can be hierarchically classified into 6 cognitive cadres of complexity which include; recall, comprehension, application, analysis, evaluation and creativity or synthesis. Recall, comprehension and application are considered as lower level skills while the remaining three are considered as higher order skills. This theory was deemed relevant to this study since unlike the previous education system (8-4-4) which placed more emphasis on the theoretical teaching of Agriculture for the sake of passing the final examinations, the CBC tends to take a much more practical approach with more emphasis being placed on the acquisition of agricultural skills. This paradigm shift requires teachers as the curriculum implementers to change from the current program in which they were conversant to the new one in terms of various aspects such as subject matter, resource utilization, teaching methodologies and mode of assessment.

The second theory that formed the basis of this study was the Montessori Approach to Learning postulated by Maria Montessori which advocates for cooperation and active learning. This theory holds that the teacher should be a facilitator rather than a transmitter of knowledge during the instructional process. Based on theory, during the instructional process, a teacher should first identify the required facilities and resources, organize them, and then give ample time to the learners to explore on their own while offering guidance where necessary. This theory is relevant to this study since with the change in curriculum, there has also been a change in the teachers' role. In the 8-4-4, teachers were viewed as the main sources of knowledge since more focus was placed on rote learning as opposed to the 2-6-3-3-3 which emphasizes practical teaching thus advocating for experiential learning (Kagema & Irungu, 2018).

3. Conceptual Framework

This study focused on investigating teacher preparedness in the implementation of the competency-based agriculture subject curriculum at junior secondary schools in Kenya. The relationship between variables was summarized and presented in Figure 2.

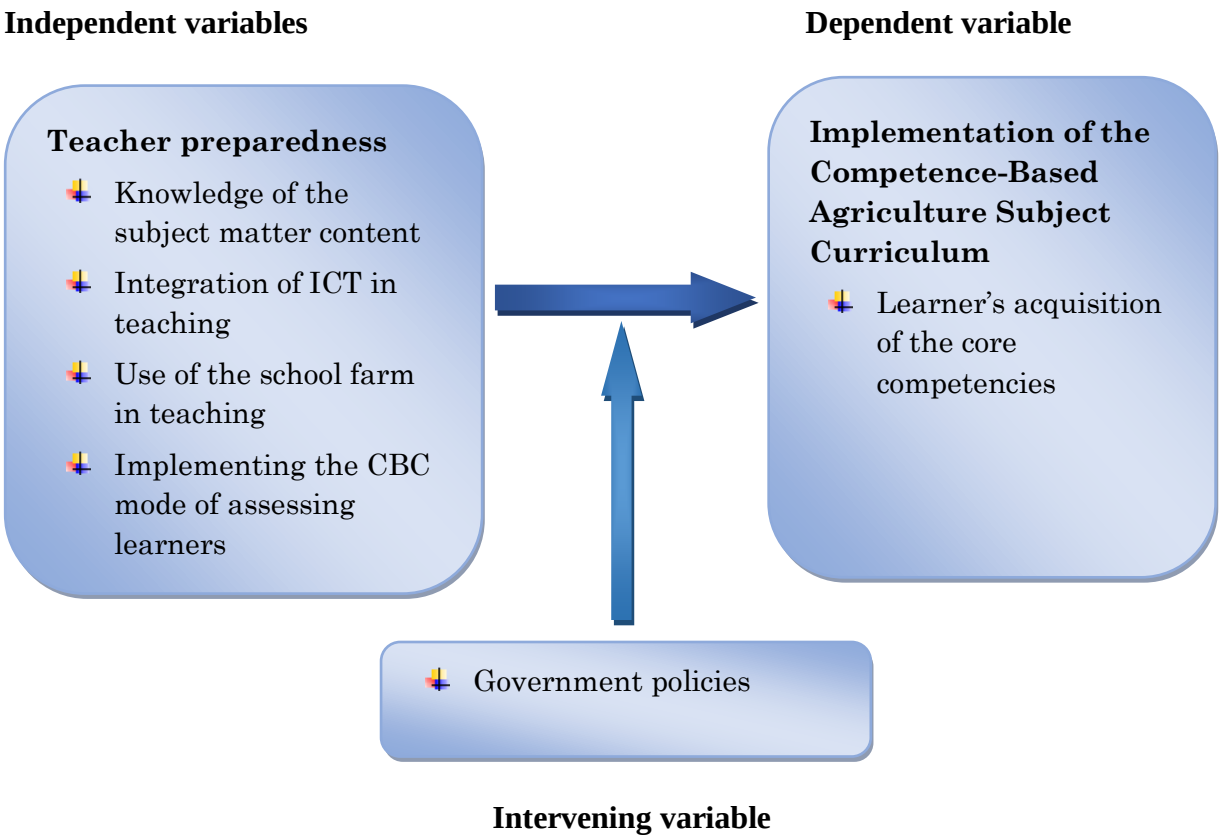

Figure 2: *Conceptual framework showing the relationship between variables in the study.*

From the summary in Figure 2 teacher preparedness was the independent variable in the study which was indicated by agriculture teacher's knowledge of the subject matter content, integration of ICT in teaching, use of the school farm in teaching and implementing the CBC mode of assessing learner's agriculture subject. Teacher preparedness was likely to affect the implementation of the agriculture subject curriculum at junior secondary school and therefore this became the dependent variable. Successful implementation of the competence-based agriculture subject curriculum was indicated by learners' acquisition of the required core competencies by learners. Government policies were the intervening variable in the study. These included government policies that affected teacher preparedness in the implementation of the competence-based agriculture subject curriculum. These are conducting in-service training for teachers, equipping schools with the required resources and facilities to enable the teaching of agriculture teachers and employment of qualified teachers at junior secondary schools among others. Since the researcher had no control over the intervening variables its effect on the independent and the dependent variable was ignored.

4. Method

The study adopted a desktop research design. Documents from the Kenya Institute of Curriculum Development (KICD) related to the CBC such as the needs assessment report on curriculum change and the report on CBC activities presented to the national steering committee were used as sources of literature. Information gathered from peer-reviewed journals from various authors related to competency-based agriculture subject at junior secondary school were also crucial sources of literature for the study. Data obtained from the relevant sources was analyzed qualitatively.

5. Results

5.1 Teachers' Subject Matter Content

The results on teacher preparedness in terms of knowledge of the subject matter content of agriculture subject in junior secondary schools in Kenya were gathered from prior studies and other relevant government documents. This study gathered and analyzed information on the following key areas; teachers' knowledge of the agriculture subject teaching methodologies, the extent of the in-service training of teachers on the implementation of competency-based agriculture subject and mastery of agriculture subject content by agriculture teachers.

On teachers' knowledge of agriculture subject teaching methodologies in junior secondary, this study found that most teachers are aware of the recommended teaching methodologies of agriculture subject in junior secondary (Ministry of Education [MoE], 2021). These are such as carrying out projects, on-farm demonstrations, field visits, and group methods among other practical-based learning methods. However further literature review

noted that agriculture teachers rarely use these practical learning methods in teaching agriculture subject in junior secondary school. This is because the Kenya Institute of Curriculum Development (2017) was found to allocate little time for teaching agriculture subject (3 lessons per week). Therefore, this was found to limit the time needed for practical teaching. In addition, most junior secondary schools were found to have few resources and facilities to facilitate practical teaching of the agriculture subject. These are such as school farms, workshops, agriculture laboratories, and farm tools among others.

On the level of in-service training agriculture teachers had received, it was found that a large number of agriculture teachers had either received little or no training on implementation of competency-based agriculture subject curriculum. For example, in Kirinyanga county according to (Muchiri, 2021) 87% of teachers had not received training on the implementation of competency-based agriculture curriculum. This could lead to teacher's lack of knowledge on how they can guide learners to acquire the required competencies during the teaching and learning process (Ouma et al., 2021).

A review of related literature on teacher's mastery of the subject content revealed that about 97% of agriculture teachers in junior secondary have low mastery of the subject content (Okeyo and Mokua, 2023). This is because in most junior schools, agriculture subject is taught by teachers who are not technically trained to teach the subject and therefore they could not easily master the subject content. This was due to the failure of the government to employ at least a trained teacher to handle each of the specific learning areas and subjects at junior secondary schools. The presence of a low number of recruited agriculture teachers in junior secondary school brought by the recruitment criteria of the Teacher's Service Commission (TSC) of employing teachers based on the period of stay without employment by the commission after graduation. This has led to mostly recruitment of the overstayed art subjects-based teachers who are required to teach all the learning areas in junior secondary including agriculture subject. In addition, the new competency agriculture subject content has been designed to enable learners to interact with the outside community, carry out practical activities, inclusion of Key Inquiry Questions (KIQs) to guide learners, and specific core competencies which learners should acquire on each strand among others (Kenya Institute of Curriculum Development, 2024). This is different from the syllabus design of the existing 8-4-4 education system agriculture subject which agriculture teachers have been implementing which simply includes a list of topics, notes and class activities that should be undertaken during learning. This study has found agriculture teachers in junior secondary to have limited knowledge of how to implement the newly introduced competency-based agriculture subject curriculum.

5.2 Teacher Preparedness in the Integration of Information Communication Technology in the teaching of the agriculture subject in junior secondary school

According to the Kenya Institute of Curriculum Development (2017) and Ministry of Education [MoE] (2021) implementation of competency-based agriculture subject requires active use of ICT tools in teaching to help learners master the required core competencies. The teachers of agriculture at junior secondary school are required to be aware of and actively use relevant ICT tools in teaching. When this study investigated the level of teacher's awareness of the relevant ICT tools which can be used in teaching agriculture it was found that a large number of teachers are aware of several ICT tools which they can use to deliver agriculture content in junior secondary school. These ICT tools were such as computers, projectors, DVDs, and routers among others. However, this study found that most teachers are not able to use these ICT tools in teaching agriculture subject. For example, in Kirinyaga County 61% of the teachers do not employ ICT tools in teaching (Muchiri, Rosana & Kiio, 2022). This is because most teachers lack know-how on the use of various ICT tools. In addition, most primary schools where junior secondary is situated lack ICT facilities for use in teaching while in others most of the ICT facilities have remained unmaintained and therefore cannot be used in teaching agriculture subject (Karani, 2023). On whether agriculture teachers had been trained on the integration of ICT tools in the teaching of the competency-based agriculture subject, it was found that a large percentage of teachers have received little or no training according to a study by (Karani, Miriam & Ng'eno, 2022). This has led to teacher's incompetency in guiding learners to perform ICT-based activities during learning. For example, guiding learners to access agricultural support services on the internet, and use computers to store information about their projects among others.

5.3 Teacher Preparedness on the Use of the School Farm

To enhance learning by doing among agriculture learners in junior secondary school, agriculture teachers should actively use school farms to guide learners to carry out learning activities which will enable learners to master the required core competencies (Odhiambo, 2020). Based on this argument this study therefore this study investigated the preparedness of teachers on the use of the school farm in teaching in the following areas; level of training on the use of the school farm in teaching, knowledge on carrying out on-farm demonstrations in the school farm, setting in the regular time table among others.

On the agriculture teacher's training on the use of the school farm in teaching agriculture subject in junior secondary school, it was found that little training had been offered to train teachers on how to use school farms to enhance practical learning. However, it was found that most teachers were able to guide learners to carry out projects and carry out on-farm demonstrations when teaching agriculture subject. The study also established that teachers of agriculture at junior secondary school have not set a specific time in the regular school timetable to carry out practical lessons on the school farm during learning. This is because the Kenya Institute of Curriculum Development (KICD) has only set 3 lessons per

week to teach agriculture subject and no additional time has been set aside to carry out practical lessons in the school farm (Kenya Institute of Curriculum Development 2023; Kenya Institute of Curriculum Development 2024).Therefore, the agriculture teacher at upper primary is only expected to carry out activities in the school farm within the three allocated lessons.

5.4 Teacher preparedness in carrying out the mode of assessment in the competency-based agriculture subject

On teacher preparedness on the use of assessment mode in the competency-based agriculture subject curriculum, this study found that; teachers were able to carry out formative and summative assessments for learners as well as keeping assessment formative assessment records for summative reporting. However, the study noted that agriculture teachers find the new assessment model in competency-based agriculture tedious and time-consuming, unlike the 8-4-4 education system assessment model which was exam-oriented. This is because, in competency-based agriculture subject assessment, the teacher has to track the learner's mastery of the required competencies throughout the learning process (Momanyi & Rop, 2020). On whether teachers can construct assessment rubrics for learners it was found that most agriculture teachers at junior secondary have little knowledge on how to create rubrics for assessing learners. This could be attributed to the limited in-service training of the agriculture teachers on conducting the competency-based assessment. However, most of the teachers were found to be competent in recording learner's performance in the already-created assessment rubrics. For example, in recording whether the learner has met expectations, approached expectations or exceeded expectations as indicated in the junior secondary school agriculture subject curriculum designs (Ministry of Education [MoE] 2021; Kenya Institute of Curriculum Development 2023; Kenya Institute of Curriculum Development, 2024)

6. Conclusions

From the findings of this study, it can be concluded that most agriculture teachers at junior secondary schools are aware of the required practical teaching methodologies for agriculture subject to help learners master the relevant core competencies. However, despite the teachers being aware of the teaching methodologies very low percentage of teachers use the practical teaching methodologies in delivering agriculture subject content. This is because they are time-consuming and little time per week was allocated by KICD for teaching the subject. It was also concluded that there are few teachers in junior secondary school technically trained to teach agriculture subject. This was attributed to the mode of recruitment done by the Teachers Service Commission (TSC) at junior secondary which is not based on the subject specialization of the teachers but the period of stay after graduation. This has also low mastery of subject content at upper primary. On the integration of ICT tools in teaching it was concluded that despite teachers of agriculture being aware of the relevant tools in teaching, still there is low use of the tools in teaching agriculture subject. This is because most teachers lacked know-how on use of the ICT tools and most schools lacked available tools for use in teaching agriculture subject. On the use of the school farm in the teaching of agriculture

subject it was concluded that most agriculture teachers at junior secondary school rarely use school farms in the teaching of agriculture subject. Finally, it was concluded that despite agriculture teachers having some knowledge of the mode of assessing competency-based agriculture, most teachers find the mode tedious and time-consuming to perform. Therefore, most agriculture teachers are not used to the new mode of assessment in competency-based agriculture subject curriculum.

7. Recommendations

Based on the conclusions made, this study recommended that;

i. Ministry of Education (MoE) to provide more in-service training to agriculture teachers at junior secondary schools to address gaps in teacher preparedness in teaching and assessment in agriculture subjects.

ii. The government of Kenya (GoK) through the Teachers Service Commission (TSC) to employ teachers at junior secondary schools based on subject specialization. This is to ensure each subject including agriculture is taught by the technically trained competent teachers to the specific subject. This will address the problem of the knowledge of the subject matter by teachers.

iii. KICD to consider increasing time allocated for teaching agriculture subject at junior secondary schools to accommodate carrying out of ICT and school farm-based activities in teaching.

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Declaration of Conflicting Interests and Ethics

The authors declare no conflict of interest.

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