Available online at **globets.org/journal**
International Journal of Education, Technology and Science
4(1) (2024) 1619–1638

IJETS
International Journal of Education Technology and Science

THE TEACHER GUIDED 4-K CLUB ACTIVITIES UNDERTAKEN WITHIN THE SCHOOL FARM FOR THE ACQUISITION OF THE CORE COMPETENCIES IN AGRICULTURE SUBJECT AT UPPER PRIMARY SCHOOL IN KENYA

(Research article)

Robert Kyalo Ndambuki [a] *, Miriam Nthenya Kyule [b], Jacob J. Konyango[c]

[a,b] *Egerton University,P.O Box 536, Egerton, 20115,Kenya*
[c]*Machakos University, P.O Box 136, Machakos, 90100, Kenya*

Received: 21.10.2023 Revised version received: 02.01.2024 Accepted: 04.01.2024

Abstract

Competency based agriculture subject at upper primary should be taught practically so as to enable learners to master the required core competencies. Among ways which teachers of agriculture at upper primary would ensure practical implementation of agriculture subject curriculum is through use of the 4-K Club activities conducted within the school farm. However, paucity of information on how agriculture teachers can use the 4-K Club activities in teaching to help learners master core competencies agriculture subject exists. It's upon this research gap therefore that this study sought to document the teacher-guided 4-K Club activities undertaken within the school farm for the acquisition of the core competencies in agriculture subject at upper primary. This study focused on documenting acquisition communication and collaboration and critical thinking and competencies. Descriptive survey research design was employed in the study. Table by Krejice and Morgan was used to obtain a sample size of 108 teachers from schools with either active or inactive 4-K Clubs in Makindu sub-county. Descriptive statistics were used in data analysis where Statistical Package for Social Sciences (SPSS) was used. This study found out that various teacher-guided 4-K Club activities have significant contribution to the acquisition of communication and collaboration and critical thinking and competencies.

Keywords: Teacher-guided; 4-K club activities; core competencies; agriculture subject

*Corresponding author (Robert Kyalo Ndambuki). ORCID ID.: https://orcid.org/0009-0007-1729-1165
E-mail: robandambuki@gmail.com

1. Introduction

1.1. Introduction to the problem

Teaching of the competency based agriculture subject requires practical approach by teachers (Konyango 2010);(Konyango & Mutisya 2017). This can be achieved by exposing learners to platforms which enable them to learn by doing both within the school and in the outside community. According to (Ministry of Education [MoE] 2021) teachers assigned to teach competency based agriculture subject at upper primary should facilitate learners to carry out agriculture projects within the school farm, carry out no-farm demonstrations, organize farming competitions among learners as well as allowing learners to share experiences during learning process. This is to enable learners master relevant competencies in agriculture subject. These competencies are; critical thinking and problem solving, communication and collaboration, creativity and imagination, digital literacy, learning to learn and citizenship (Ouma et al. 2021).

Among ways which teachers of agriculture subject at upper primary would promote acquisition of these core competencies by learners is by involving them in carrying out 4-K Club activities within the school farm. According to Karanu and Oniang'o (2017) 4-K Club is an agriculture club based in primary schools which aims at helping learners to acquire skills and competencies in agriculture. This is through involvement of learners in carrying out practical hands-on activities which are conducted in areas such school farm. These specific 4-K Club learning within the school farm are such as carrying out projects both on livestock and crop production, farming competitions, on-farm demonstrations among others (Muldoon 2010).

Following introduction of competency based curriculum in Kenya in the year 2017 (Kenya Institute of Curriculum Development 2017) Government of Kenya has revamped 4-K Clubs to make them more suitable for use in the implementation of the competency based agriculture curriculum at upper primary. In addition prior studies by Nestle Kenya (2019) and Karanu and Oniang'o (2017) found 4-K Club activities to be very essential in the implementation of competency based agriculture subject curriculum. However, little information on how teachers can actively utilize the 4-K Club activities in teaching agriculture subject to help learners acquire core competencies exists. It's upon this research gap therefore that this study sought to document the 4-K Club activities which teachers of agriculture at upper primary need to undertake within the school farm to enhance acquisition of the core competencies in agriculture subject by learners.

1.2. Relevant scholarship

Globally many nations which have embraced competency based curriculum have put in place agricultural youth clubs in schools to help in the implementation of agriculture subject curriculum (Muthomi 2017). Learners are actively engaged in carrying out the agriculture club

activities both within the school farm and in the outside community during learning to help them acquire the required competencies. For example, in United States of America (USA), Future Farmers of America (FFA) Club has been actively engaged in teaching and learning of agriculture subject in high schools (Konyango 2010). Through the club teachers provide opportunities for learners to apply what they learn in class practically in the field by working in crop farms, gardens, livestock farms, mechanic shops among others. This enables learners to master competencies in agriculture which they apply both in present time and in future in the field of work (Mugambi, Obara, and Miriam, 2022).

In United Kingdom, Young Farmers Club (YFC) of England and Wales is situated in schools for learning agriculture subject which targets learners aged between 10-26 years. The club aim at instilling practical agricultural skills to learners where agriculture teachers guide learners in carrying activities such as farming competitions, projects, agricultural tours among others (National Federation of Young Famers Clubs (NFYFC) 2016). According to Njura et al. (2020) in United Kingdom YFC has succeeded in enhancing acquisition of core competencies in agriculture subject in schools, increased learner's interest in schools as well as prepare competent generation of future farmers. In Nigeria YFC, 4-H club, Youth/Children in Agriculture and Youth alliance of Nigeria are involved in enhancing agriculture education among young people in schools (Njoroge, 2015). YFCs are run both in schools and community targeting learners aged 9-20 years (Elias et al. 2018). Learners are actively engaged in the Clubs' activities during learning process to acquire competencies in agriculture subject.

In Kenya the agricultural youth clubs engaged in agriculture education are Young Farmers Club which draws its membership in secondary schools and 4-K Club which are based in primary schools Agwu et al. (2023). The 4-K Clubs stands for *Kuungana, Kufanya, Kusaidia, Kenya* which literary means joining together, to work to help Kenya. The motto of the club is *'' Kujifunza kwa Kufanya"* which can be translated to learning by doing. Therefore, learners are required to learn by carrying out various agriculture related activities practically so as to acquire the required competencies (Shiundu, 2021). In 4-K Clubs learners should learn through carrying out projects, on-farm demonstrations, field visits, attending ASK shows and exhibitions, farming competitions and through agricultural tours (Kenya Literature Bureau 2018). Learners should also work closely with agriculture extension officers and community resource persons to help them get technical and even material assistance when carrying out the 4-K Club activities (Agwu et al. 2023). In conclusion, the motto, objective, learning methodologies and the activities of the 4-K Club match the requirements of learning competency based agriculture subject. In addition, previous studies recommended for inclusion of the 4-K Club activities in the implementation of the competency based agriculture subject curriculum thus this study seeks to document the teacher-guided 4-K Club activities which should be conducted within the school farm to facilitate implementation agriculture subject curriculum at upper primary.

1.2. Implications of the study

The findings of this study are likely to bring to the attention of agriculture teachers at upper primary the key influential 4-K Club activities that can be conducted within the school farm to help learners acquire core competencies in agriculture subject. The findings of this study will inform the Kenya Institute of Curriculum Development (KICD) and Ministry of Education (MoE) on the importance of 4-K Clubs in the implementation of the competency based agriculture curriculum. This may accelerate revival sustainability plans of the 4-K Clubs in schools for use in learning.

1.3. Research questions

This study sought to answer the following research question so as to address the problem under study; which are the teacher-guided 4-K Club activities that should be conducted within the school farm to enhance acquisition of the core competencies by learners in agriculture subject at upper primary school. The study question will guide of gathering correct and enough data from upper primary agriculture teachers on the teachers based 4-K Club activities which should be conducted within the school farm to enhance acquisition of the core competencies by learners in agriculture subject.

2. Method

2.1. Research design

This study employed descriptive survey research design. The design is appropriate in getting people's views, attitudes, behaviors or any other issue connected to education. Therefore, it was deemed to be good in gathering agriculture teacher's views on the teacher-guided 4-K Club activities which should be carried out within the school farm to enhance acquisition of the core competencies in agriculture subject by learners.

2.2. Study area

This study was conducted in primary schools in Makindu Sub-County which is located in Makueni County, Kenya. The sub-county has a coverage of 1034.7 square km with a population of 84,946 accommodated in 21,756 households. It lies at an attitude of 993 meters above sea level and therefore has semi-arid characteristics. The vegetation which commonly present in the area is acacia, euphorbia, baobab and thorny shrubs. The sub-county receives an average rainfall of 595 mm per annum which is little and unreliable (Makueni County Meteorological Office 2022). The area is therefore categorized as among the driest parts of Makueni County (Makueni County Government 2018). The sub-county experiences an average temperature of 22.9^{o}C with march being the hottest month with average temperature

of 24.8°C and July having lowest temperatures of 20.4°C (Climate Data Organization 2020). The main economic activity in Makindu Sub-County is small scale farming, charcoal production and local trade. The area was chosen for this study because no similar has ever been conducted there (Makindu Sub-County Education office 2022). In addition, the sub-county has researchable number of primary schools with either active or inactive 4-K Club.

2.3. Participant (subject) characteristics

Teachers assigned to teach agriculture subject at upper primary from schools with either active or inactive 4-K Clubs were involved in the study. The inclusion was done regardless of the gender, level of education, age and levels of training on management of the 4-K Clubs.

2.4. Sampling procedures and sample size

Teachers assigned to teach agriculture subject from schools with either active or inactive formed the sampling frame in this study. Stratified random sampling was used to select the sample size for teachers where schools were categorized into two main strata namely; those with active and inactive 4-K Clubs. The total sample size of 108 agriculture teachers was drawn from a table by (Krejice & Morgan, 1970) of determining sample sizes based on accessible population of 150 teachers of which 44 are from schools with active and 106 are from schools with inactive 4-K Clubs. Proportionate sampling was used to determine the sample size to be drawn from each strata using the formula;

ni=(n/N)Ni

Where:

n_i =Sample of the strata

n = sample size

N = population

N_i=population of the strata

n= 108, N= 150, N_i for schools with active 4-K Clubs is 44 and 106 for schools with inactive 4-K Clubs. Therefore, all the sampled teachers from schools with active and inactive 4-K Clubs were 32 and 76 teachers respectively.

2.5. Measures and covariates

Closed ended questionnaires were used to collect data from all agriculture teachers selected to participate in the study. To ensure reliability of the instruments a pilot study comprising of 30 agriculture teachers was conducted at Kibwezi East Sub-County. Split-half method of

determining reliability of research instruments was used where correlation co-efficient of 0.79 was obtained hence deeming the questionnaire to be reliable.

3. Results and discussion

3.1. Demographic characteristics of the respondents

3.1.1. Gender of the respondents

Respondents were asked to indicate their gender. The results were analyzed and presented

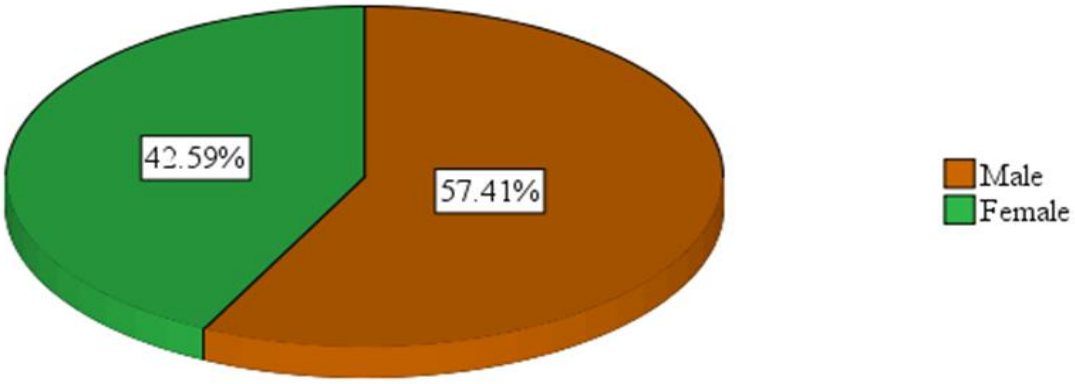

Figure 1: *Distribution of the Agriculture Teachers by Gender*

The results indicated that 57.41% of the respondents were males while 42.59% were females. The findings concurred with findings by Karani et al. (2022) that there are more male agriculture teachers than females at upper primary schools. However presence of fewer female agriculture teachers was linked to low preference to teaching vocational subjects by female teachers as noted by (Makarova, Aeschlimann, & Herzog 2019). Figure 1 below indicates a summary the distribution of agriculture teachers by gender at upper primary

3.1.2. Age of the respondents

Teachers were also asked to indicate their age range. The results were analyzed and recorded in figure 2.

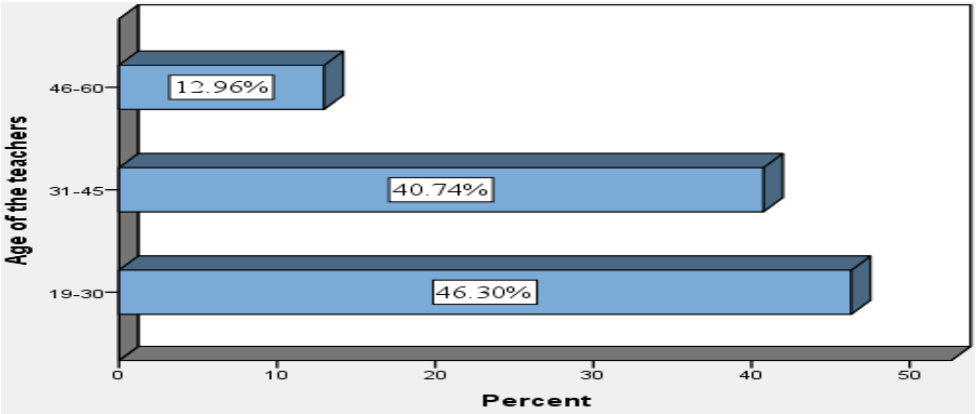

Figure 2: *Distribution of agriculture teachers by age*

The results indicated that 12.96% of the respondents had their age ranging between 46-60 years, 40.74% ranged between 31-45 years while 46.30% were aged between 19-30 years. This indicated that most upper primary teachers at Makindu sub-county are at age bracket of youth who are termed to be most productive people in terms of working according to (Magagula &Tsvakirai 2020). Its therefore expected that most teachers in Makindu Sub-county are very effective in implementing competency based agriculture subject curriculum which (Nyaboke, Kereri & Nyabwari 2021) finds it engaging.

3.1.3 Teacher's experience of teaching agriculture subject at upper primary

Agriculture teachers were asked to indicate their experience of teaching agriculture subject at upper primary in terms of years. The results were presented in figure 3.

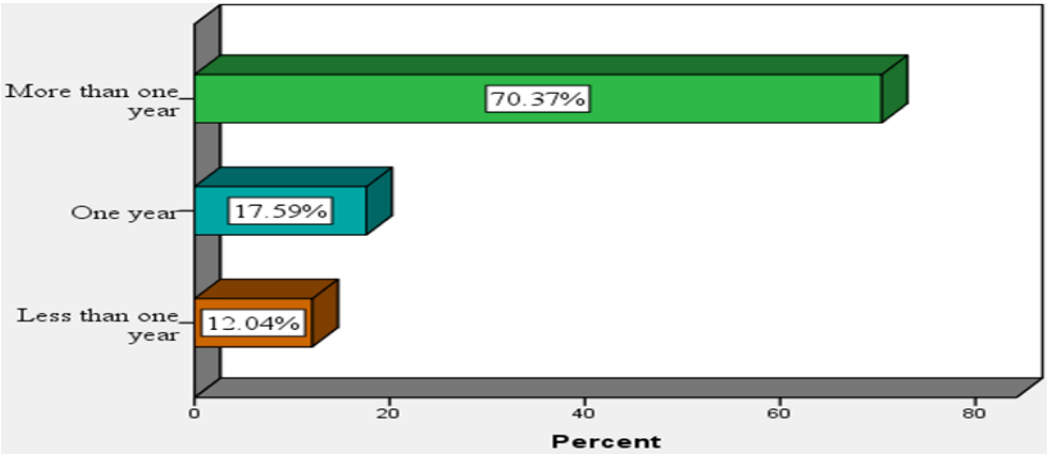

Figure 3: *Teacher's experience of teaching agriculture subject at upper primary*

It was found out that 70.37% of the teachers had taught for more than one year, 17.59% had taught for one year while only 12.04% of the teachers had taught for less than a year. It was

therefore concluded that largest number of teachers at Makindu sub-county had a longer experience teaching agriculture subject at upper primary. Similar findings were presented by Kubai (2023) who noted that over 65% of teachers at upper primary had a teaching experience of more than one year. According to Samoei (2020) teachers with longer experience have better understanding of how to implement a curriculum by employing the right methods, approaches and platforms at the required time. It is therefore anticipated that most teachers at Makindu Sub-County are aware of the type of 4-K Club activities conducted within the school farm that can help learners acquire core competencies in agriculture subject.

3.1.4. Teachers perception on the relevance of the 4-K Club activities in teaching of agriculture subject at upper primary

Agriculture teachers were also asked to indicate their view on relevance of 4-K Clubs in teaching of competency based agriculture subject at upper primary. The results were analyzed and summarized in figure 4.

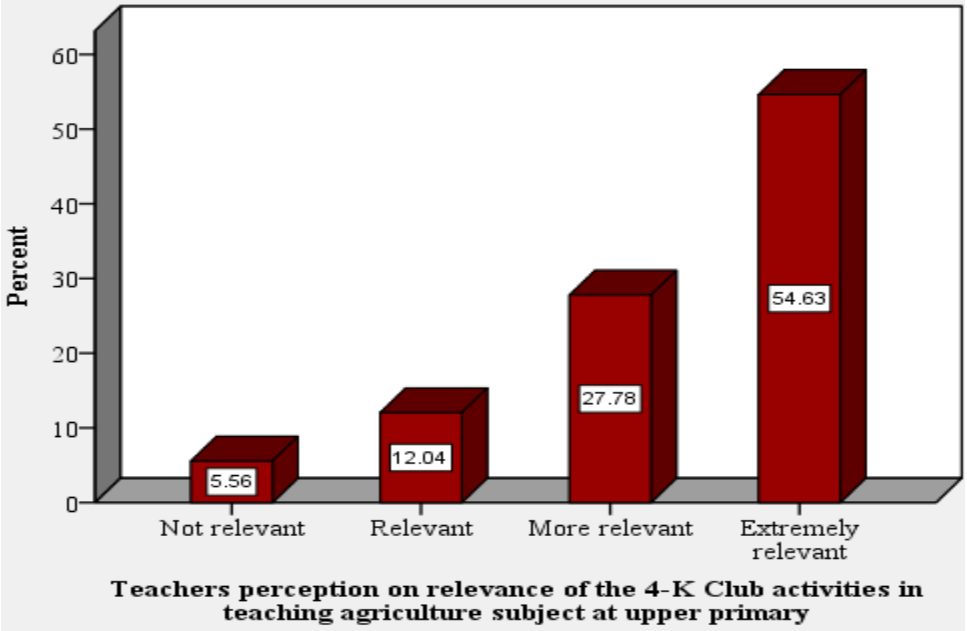

Figure 4: *Teacher's perception on the relevance of the 4-K Clubs in teaching of agriculture subject at upper primary.*

From the findings large number of teachers (27.78% and 54.63%) agreed that 4-K Clubs are more relevant and extremely relevant respectively in teaching of agriculture subject at upper primary. 12.04% of agriculture teachers who participated in the study stated that the clubs are relevant while only a small percentage of teachers (5.56%) indicated the clubs are not relevant in teaching of competency based agriculture. This study therefore concluded that 4-K Clubs

are extremely relevant in teaching of agriculture subject in primary schools. These results and conclusion were in line with Nestle Kenya (2019) that 4-K Clubs are relevant to teaching of agriculture subject and that projects chosen should be in line with agriculture curriculum in schools to help learners master competencies .

3.1.5. Agriculture teacher's level of qualification

The teachers were also asked to indicate their level of academic qualification. The results were analyzed and presented in figure 4.

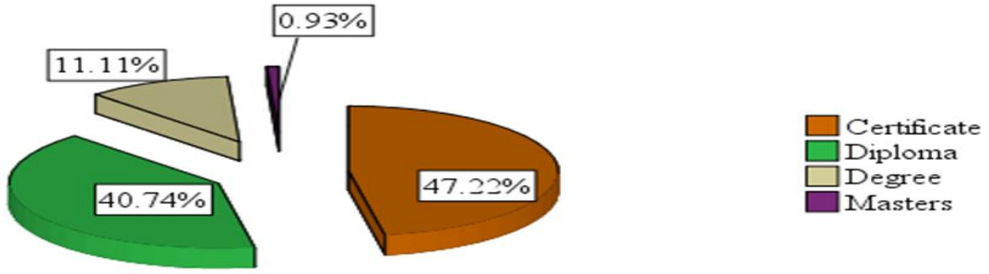

Figure 5: *Teachers level of academic qualification*

From the results recorded it was evident that largest number of teachers (47.22%) were certificate holders, 40.74% of the teachers had qualified up to diploma level while only 11.11% and 0.93% of the teachers had bachelor's and master's degrees respectively. The results contradicted findings by Karani et al. (2022) who noted slightly higher number of diploma teachers than those holding a P1 certificate. However, the two studies noted an increasing number of diploma teachers at primary schools which was linked to Teachers Service Commission (TSC) prioritization on employing diploma teachers and urging the certificate teachers to go for nine months upgrade training. This is to ensure teachers are equal to the task of implementing the Competency Based Curriculum (CBC) (Nyaundi 2021).

3.1.6. Impact of the 4-K Clubs on learner's acquisition of the competencies in agriculture subject

A comparison study between schools with active and those with inactive 4-K Clubs was done to determine whether 4-K Clubs have a significant impact on learner's acquisition of competencies in agriculture subject. The sampled 32 teachers from schools with active and 76 teachers from schools with inactive 4-K Clubs were asked to assess how learners from their respective schools were competent in carrying out various agricultural activities. This was by rating learners in a five scaled Likert which was whether learners are not competent, somehow competent, competent, more competent and extremely competent. The collected data was analyzed by use of means where the researcher developed a measurement scale which was

used to determine the learner's level of competency. Any item that scored a mean of between 1-1.5 was categorized as very low indicating that most of learners were not competent, 1.6-2.4 as low indicating that most of the learners were somehow competent, 2.5-3.3 as moderate indicating that learners were competent, 3.4-4.2 as high indicating that learners were more competent and 4.3-5.0 as very high indicating that learners were extremely competent.

Table 1: *Impact of the 4-K Club activities on learner's acquisition of the agricultural skills*

Competency in carrying out a particular agricultural activity	Schools with inactive 4-K Clubs				Schools with active 4-K Clubs			
	N	Minimum	Maximum	Mean	N	Minimum	Maximum	Mean
Learner's competency in carrying out projects on crop production	76	1.00	4.00	2.25	32	1.00	5.00	4.56
Learner's competency in carrying out projects on livestock production	76	1.00	5.00	1.49	32	1.00	5.00	3.81
Learner's competency in controlling pests, parasites and diseases	76	1.00	5.00	2.07	32	1.00	5.00	3.88
Ability to employ different methods to control weeds that affect crops in the project plots	76	1.00	5.00	2.80	32	2.00	5.00	4.06
Learner's competency in preparing innovative gardens	76	1.00	5.00	1.74	32	1.00	5.00	3.44
Learner's competency in employing water conserving techniques	76	1.00	5.00	2.25	32	2.00	5.00	4.16

From the results in table 1 it was found that in schools with active 4-K Clubs most learners were more competent in carrying out various agricultural skills unlike their counterparts from schools with inactive 4-K Clubs. This indicated that 4-K Clubs have significant impact on learner's acquisition of the agricultural skills. Similarly Agwu et al. (2023) recorded that 4-K Clubs in schools have great contribution to learner's acquisition of practical agriculture skills. For example, on Learner's competency in carrying out projects on crop production schools with inactive 4-K Clubs had a mean of 2.25 indicating that most learners from such schools were competent in carrying out the activity while in schools with active 4-K Clubs the mean was 4.56 indicating that learners were extremely competent in carrying out the activity. On Learner's competency in carrying out projects on livestock production schools with inactive 4-K Clubs had a mean of 1.49 showing that most of the learners are not competent while schools with active 4-K Clubs had a mean of 3.81 indicating that learners were more competent. On Learner's competency in controlling pests, parasites and diseases schools with inactive 4-K

Clubs had a mean of 2.07 while those with active 4-K Clubs had a mean of 3.88 which was higher than that of schools with inactive 4-K Clubs.

On learner's ability to employ different methods to control weeds that affect crops in the project plots, schools with inactive 4-K Clubs had a mean of 2.8 indicating that learners were competent while those with active 4-K Club the mean score was 4.06 indicating that most learners were more competent in carrying out the activity. The activity on competency in preparing innovative gardens the results found out that most learners were somehow competent in carrying out the activity in schools with inactive 4-K Clubs while those from schools with active 4-K Clubs were more competent more competent in carrying out the activity. On learner's competency in employing water conserving techniques schools with inactive 4-K Clubs scored a mean of 2.25 indicating that most learners were somehow competent in carrying out the activity while in schools with active 4-K Clubs had a mean of 4.16 indicating that most learners were more competent in carrying out the activity. The findings in this study indicated that in schools with active 4-K Clubs most learners had acquired practical agricultural skills. This could have been contributed by most learners practicing various agricultural activities which should be conducted in 4-K Clubs. The findings of this study concurred with views by James (2021) that 4-K Club activities have significant influence on learner's acquisition of practical agriculture skills.

3.1.7. Recommendation on primary school teachers training on management of the 4-K Clubs

Respondents were asked to recommend level to which they would recommend primary school teachers to be trained on management of the 4-K Clubs in their different levels of training. The results were analyzed and recorded in Table 2 below.

Table 2: *Recommendation on level to which Primary School Teachers should be Trained on Management of the 4-K Clubs*

	Frequency	Percent
Not at all	0	0
Very inadequately	0	0
Inadequate	6	5.6
Adequate	65	60.2
Very adequate	37	34.3
Total	108	100.0

The results indicated that 34.3% and 60.2% of the teachers recommended to very adequate and adequate training of primary school teachers on management of the 4-K Clubs in their

different levels of training. Only 5.6% recommended for inadequate training while none of the teachers recommended for very inadequate or lack of training. These results concurred with the 4-K Club (2023) plan of carrying out an in-service training of all teachers in primary school to educate them on how to start, run and use 4-K Club activities in teaching of agriculture subject.

3.1.8. Teacher-guided 4-K Club activities within the school farm leading to the acquisition of the core competencies by learners in agriculture subject

Though there are seven core competencies namely communication and collaboration, critical thinking and problem solving, creativity and imagination, learning to learn, self-efficacy, citizenship and digital literacy, this study focused on determining acquisition of only two competencies namely; communication and collaboration and critical thinking and problem solving. Therefore, agriculture teachers were asked to indicate whether the stated teacher guided 4-K Club activities within the school farm in tables 2 and 3 promoted acquisition of the above selected competencies and extent to which they would lead to the acquisition.

3.1.8.1. Teacher-guided 4-K Club Activities within the school farm leading to the acquisition of communication and collaboration competency by learners in agriculture subject

Teachers were first asked to indicate whether and the extent to which the stated teacher-guided 4-K Club activities led to the acquisition of communication and collaboration competency by learners. The results were analyzed and recorded in Table 3.

Table 3: *Teacher-guided 4-K Club Activities within the school farm leading to the acquisition of communication and collaboration competency by learners in agriculture subject* ***(n=108)***

Activity		Competency	Extent of leading to the competency				
		Communication and collaboration	NA	VL	L	A	AA
Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects	Freq	41	-	13	19	7	2
	%	38	-	12	17.6	6.5	1.9
Helping learners to come up with innovative gardens when carrying out their projects	Freq	38	-	3	26	3	6
	%	35.2	-	2.8	24.1	2.8	5.6

Guide learners to come up with innovative ways of conserving water when carrying out the projects	Freq	35	-	4	16	12	3
	%	32.4	-	3.7	14.8	11.1	2.8
Placing learners in groups to carry out projects	Freq	107	-	-	6	51	50
	%	99.1	-	-	5.6	47.2	46.3
Allowing learners to share experiences when carrying out projects	Freq	108	-	-	6	49	53
	%	100	-	-	5.6	45.4	49.0
Carry out on farm demonstration in 4-K Club plots during learning.	Freq	103	-	1	1	52	49
	%	95.4	-	0.9	0.9	48.1	45.4
Organizing 4-K Club farming competitions among individual learners	Freq	98	-	-	4	54	40
	%	90.7	-	-	3.7	50.0	37.0
Organizing 4-K Club farming competitions among learners in groups	Freq	100	-	-	4	42	54
	%	92.6	-	-	3.7	38.9	50.0

From the results three teacher-guided 4-K club activities were found to have very little impact on learner's acquisition of communication and collaboration competency. This is because the activities had few numbers of teachers agreeing that they promote acquisition of the competency. These were; Guiding learners to come up with innovative ways of parasite, pest and disease control methods, innovative gardens and innovative ways of conserving water when carrying out their projects. The findings were supported by curriculum designs developed by Ministry of Education [MoE] (2019) and Ministry of Education [MoE] (2021) which categorized activities such as coming up with innovative gardens, innovative ways of conserving water and pest, parasite, disease control methods as among activities which had little impact on enhancing communication and collaboration competencies among learners.

On placing learners in groups to carry out projects 99.1% of the teachers who participated in the study agreed that the activity promoted communication and collaboration competency with 47.2% and 46.3% of the teachers who agreed indicating that the level of impact was average and above average respectively. All the 108 teachers who participated in the study agreed that allowing learners to share experiences when carrying out 4-K Club projects promoted acquisition of communication and collaboration competency with 5.6%, 45.4% and 49.0% indicating that the level of impact of the activity was little, average and above average respectively. The above findings were in line with Kenya Institute of Curriculum Development (2017) that by allowing learners to learn in groups and share experiences enhances acquisition of communication and collaboration competency among them.

When asked whether conducting on farm demonstrations promoted acquisition of the competency 95.4% agreed with 48.1% and 45.4% indicating that the level of impact was above average. The findings concurred with results of Ouma et al. (2021) which noted that conducting on farm demonstrations when teaching agriculture strongly promoted acquisition of communication and collaboration competency learners. On whether 4-K Club farming competitions promoted acquisition of communication and collaboration competency, 90.7% agreed on individual competitions while 92.6% on group farming competitions with large number of teachers agreeing that the level of impact was above average. Similar results were recorded by Asava (2021) who noted strong influence of conducting farming competition on learner's acquisition of communication and collaboration competency.

3.1.8.2. Teacher-guided 4-K Club Activities within the school farm leading to the acquisition of critical thinking and problem solving competency by learners in agriculture subject

Respondents were also asked to indicate whether the stated teacher-guided 4-K Club activities conducted within the school farm also led to the acquisition of critical thinking and competency. The results were analyzed and recorded in Table 4.

Table 4: *Teacher-guided 4-K Club Activities within the school farm leading to the acquisition of critical thinking and competency by learners in agriculture subject* (***n=108)***

Activity		Competency	Extent of leading to the competency				
		Critical thinking and problem solving	NA	VL	L	A	AA
Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects	Freq	103			4	48	52
	%	95.4	-	-	2.8	44.4	48.1
Helping learners to come up with innovative gardens when carrying out their projects	Freq	105	-	-	1	45	59
	%	97.2	-	-	0.9	41.7	54.6
Guide learners to come up with innovative ways of conserving water when carrying out the projects	Freq	103	-	-	-	38	65
	%	95.4	-	-	-	35.2	60.2
Placing learners in groups to carry out projects	Freq	31	-		4	18	9
	%	28.7	-		3.7	16.7	8.3
Allowing learners to share experiences when carrying out projects	Freq	11	-	2	1	3	5
	%	10.2	-	1.9	0.9	2.8	4.6

Carry out on farm demonstration in 4-K Club plots during learning.	Freq	54	-	-	6	44	4
	%	50	-	-	5.6	40.7	3.7
Organizing 4-K Club farming competitions among individual learners	Freq	73	-	-	7	45	21
	%	66.6	-	-	6.5	41.7	19.4
Organizing 4-K Club farming competitions among learners in groups	Freq	72	-	-	5	38	29
	%	66.7	-	-	4.6	35.2	26.9

From the results in the findings most of the activities strongly enhanced acquisition of critical thinking and competency. These were; Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects with 95.4% of the teachers who participated in the study indicating that it promoted acquisition of the competency and 48.1% of the teachers who agreed indicating that the level of impact was above average, helping learners to come up with innovative gardens when carrying out their projects where 97.2% of the teachers who participated in the study agreed with 54.6% indicating that the level of impact was above average. On guiding learners to come up with innovative ways of conserving water when carrying out the projects 95.4% of the teachers who participated in the study agreed with 35.2% and 60.2% stating that the level of impact was average and above average respectively. The results were in line with views by Kituu (2023) who noted that any activity that promotes innovativeness among learners also enhances acquisition of critical thinking and problem solving competency.

On organizing learners to carry out 4-K Club farming competitions 66.6% and 66.7% of the teachers indicated that individual and group learner farming competitions respectively enhanced acquisition of critical thinking and problem-solving competency. The other activity which was found to have high influence on learner's acquisition of critical thinking and problem-solving competency was Carrying out on farm demonstration in 4-K Club plots during learning where 50% of the teachers agreed that it promoted acquisition of the competency. These findings were supported by Jones and Edwards (2019) and Nzomo (2021) in that conducting on-farm demonstrations and farming competitions when teaching promotes acquisition of critical thinking and problem solving competency.

Teacher-guided 4-K Club activities within the school farm which had little influence on acquisition of critical thinking and problem-solving competency were; placing learners in groups to carry out agriculture projects where only 28.7% of the teachers were in agreement and allowing learners to share experiences when carrying out 4-K Club projects where only 10.2% of teachers who participated in the study agreed. This is because the two activities encouraged learners to interact more than to think critically. Similar observations were made by Wale and Bishaw (2020) however they contradicted findings by (Waiganjo 2021) in that by allowing learners to share experiences strongly enhances acquisition of critical thinking and problem solving competency.

4. Conclusions

Based on findings this study concluded that, all the teacher-guided 4-K Club activities undertaken within the school farm have some contribution to the acquisition of both communication and collaboration and problem solving and problem-solving competencies. However, the following activities strongly enhances acquisition of communication and collaboration competency; Placing learners in groups and allowing them to share experiences when carrying out projects, carrying out on farm demonstration in 4-K Club plots during learning and organizing 4-K Club farming competitions among learners both individually and in groups. Those teacher-guided 4-K Club activities within the school farm which would strongly promote acquisition of critical thinking and problem solving competency were; Guiding learners to come up with innovative ways of parasite, pest and disease control methods in their projects, innovative gardens and ways of conserving water when carrying out the projects, Carrying out on farm demonstration in 4-K Club plots during learning and organizing 4-K Club farming competitions among learners both individually and in groups.

5. Recommendations

This study recommends that;

i. Government of Kenya to equip primary schools with sufficient facilities such as school farm to be used in carrying 4-K Club activities which aid in teaching competency-based agriculture subject.
ii. Schools with non-performing 4-K Clubs to consider reviving them for use in the implementation of competency-based agriculture curriculum.
iii. Primary schools to lay down strategies to ensure active use of the school farm based 4-K Club activities in teaching of agriculture subject.
iv. Government of Kenya to ensure proper linkage between 4-K Clubs in schools and Ministry of Agriculture, Irrigation, Livestock, Fisheries and Cooperatives (MoAILF&C) to ensure that the clubs remain active in schools for learning.

6. Acknowledgements

I thank the almighty God for granting me good health and protection during the study period. Secondly am appreciative to my supervisors Dr. Miriam Kyule, PhD and Dr. Jacob Ochieng' Konyango, PhD for nurturing me academically and for their unwavering support in shaping this research study. I owe sincere gratitude to my fellow academicians in department of agriculture education and extension and faculty of education and community studies of Egerton University for their constructive criticism which was made to improve this research study.

Declaration of Conflicting Interests and Ethics

Authors declare no conflict of interest.

References

4-K Club. 2023. '4-K-Clubs-Newsletter Issue 1: The 4-K Clubs Competition Launched'. *MoALF&C*, 1–15.

Agwu, Agwu, Murari Suvedi, Charity Chaza, Kristin Davis, Agnes Nkurumwa, Margaret Mangheni, and P. V. K. Sasidhar. 2023. *Agricultural Extension and Advisory Services in Nigeria, Malawi, South Africa, Uganda, and Kenya*. *Research*. USA: Michigan State University.

Asava, Justus Kiyai. 2021. 'Influence of Teacher Pedagogies on Implementation of Competency-Based Curriculum in Public Primary Schools in Westlands Sub- County, Nairobi City County, Kenya'. University of Nairobi, Kenya.

Climate Data Organization. 2020. 'Climate of Makindu Sub-County'. *Climate Data. Org*. Retrieved 3 July 2021 (https://en.climate-data.org/africa/kenya/makueni/makindu-103851/).

Elias, Marlène, Netsayi Mudege, Diana E. Lopez, Dina Najjar, Vongai Kandiwa, Joyce Luis, Jummai Yila, Amare Tegbaru, Gaya Ibrahim, Lone Badstue, and Esther Njuguna-Mungai. 2018. 'Gendered Aspirations and Occupations among Rural Youth, in Agriculture and beyond: A Cross-Regional Perspective'. *Journal of Gender, Agriculture and Food Security* 3(1):82–107.

James, Harriet. 2021. '4K Club Returns to Equip Pupils with Farming Skills'. *Peoples Daily*. Retrieved 30 October 2021 (https://www.pd.co.ke/business/4k-club-returns-to-equip-pupils-with-farming-skills-81493/).

Jones, Mason C., and M. Craig Edwards. 2019. 'Competition as an Instructional Approach in School-Based, Agricultural Education (SBAE): A Historical Review'. *Journal of Agricultural Education* 60(1):109–28. doi: 10.5032/jae.2019.01109.

Karani, Alex, Kyule Miriam, and Joel Ng'eno. 2022. 'How Are Teachers Trained for Teaching Competence Based Grade Four Agriculture? A Case of Public Primary Schools in Njoro Sub-County in Nakuru County'. *International Journal of Education Technology and Science* 2(3):399–414.

Karanu, MN, and RK Oniang'o. 2017. 'Impacting Nutrition Through Schools: Rural Outreach Program (ROP) Africa 4H Program Profile'. *African Journal of Food, Agriculture, Nutrition and Development* 17(3):1–21.

Kenya Institute of Curriculum Development. 2017. 'Basic Education Curriculum Framework'.

Kenya Literature Beareau. 2018. *Secondary School Agriculture Book 4*. Fourth Edition. Nairobi: Kenya Literature Beaural.

Kituu, Shedrack. 2023. 'Competency Based Curriculum and Creativity Learning Outcomes Among Grade Four Pupils in Makueni County, Kenya'. Machakos University, Kenya.

Konyango, Jacob. 2010. 'An Analysis of the Implication of Education Policies Influencing Secondary School Agriculture in Kenya and Their Implications on Curriculum Improvement between 1959 and 2004'. Egerton Unversity.

Konyango, Jacob, and Daniel Mutisya. 2017. 'International Aid and Funding of Vocational Education: Lessons on Vocationalization of School Agriculture- Kenya 1959 -1984'. *International Journal of Research Studies in Agricultural Sciences* 3(11):57–64. doi: http://dx.doi.org/10.20431/2454-6224.0311005.

Krejice, Robert, and Daryle Morgan. 1970. 'Determining Sample Size for Research Activities'. 30:607–10.

Kubai, Edwin. 2023. 'A Critical Review of the Challenges Facing the Competency- Based Assessments in the Competency-Based Curriculum in Nairobi County, Kenya'. 3(3):1–13.

Magagula, Buyisile, and Chiedza Z. Tsvakirai. 2020. 'Youth Perceptions of Agriculture: Influence of Cognitive Processes on Participation in Agripreneurship'. *Development in Practice* 30(2):234–43. doi: 10.1080/09614524.2019.1670138.

Makarova, E., B. Aeschlimann, and W. Herzog. 2019. 'The Gender Gap in STEM Fields: The Impact of the Gender Stereotype of Math and Science on Secondary Students' Career Aspirations. Frontiers in Education'. *Frontiers in Education* 4:60. doi: https://doi.org/10.3389/feduc.2019.00060.

Makindu Sub-County Education office. 2022. 'Learners and Teachers Statistics and Enrollment in Upper Primary'.

Makueni County Government. 2018. 'Makueni County Integrated Development Plan 2018-2022 (1).'

Makueni County Meteorological Office. 2022. 'Makueni County Seasonal Climate Forecast Valid October-December 2022'.

Ministry of Education [MoE]. 2019. 'Upper Primary Curriculum Designs [GRADE5]: Mathematics, Science and Technology, Agriculture, Home Science, Physical &Health Education'.

Ministry of Education [MoE]. 2021. 'Upper Primary Curriculum Designs[GRADE 6]:Mathematics, Science and Technology, Agriculture, Home Science, Physical &Health Education'.

Mugambi, Dixon Kathurima, James Obara, and Kyule N. Miriam. 2022. 'An Investigation of the Relationship Between Students' Enrolment in Young Farmers Club of Kenya (YFCK) and Establishment of Individual Farm Projects at Home: A Case of Public Secondary Schools in Njoro Sub- County, Kenya'. *International Journal of Education, Technology and Science* 2(2):213–28.

Muldoon, Jennifer. 2010. 'Planning-for-More-Effective-Environmental-Education-in-International-Development-Projects-A-Case-Study-of-the-Swedish-Cooperative-Center-Vi-Agroforestry-Programme-Kisumu-Kenya.Pdf'. A major project Submitted in partial fulfillment of the requirements For the degree of Master of Science, The University of Guelph, United States of America.

Muthomi, Eric. 2017. 'Challenges and Opportunities for Youth Engaged in Agribusiness in Kenya'. A Project Report Submitted to the School of Business in Partial Fulfillment of the Requirement for the Degree of Masters in Global Executive Master of Business Administration (GeMBA), United States International University.

National Federation of Young Famers Clubs (NFYFC). 2016. 'Who We Are'. *National Federation of Young Famers Clubs*. Retrieved 8 July 2021 (http://www.nfyfc.org.uk/?AspxAutoDetectCookieSupport=1).

Nestle Kenya. 2019. 'Nestlé Kenya Roots for the Return of 4k Clubs with Launch of School Nutrition Gardens Program'. *The Daily Mail*. Retrieved 30 October 2021 (https://thedailymail.co.ke/nestle-kenya-roots-for-the-return-of-4k-clubs-with-launch-of-school-nutrition-gardens-program/).

Njoroge, David. 2015. 'Influence of Young Farmers Club of Kenya Activities on Secondary School Students' Performance in Kenya Certificate of Secondary Education Agriculture Examination in Rongai Sub-County of Nakuru County.' A Thesis Submitted to the Board of Postgraduate Studies in Partial Fulfillment of the Requirements for the Award of the Degree of Master of Science in Agricultural Education, Egerton Unversity, Kenya.

Njura, Hellen Joseph, Kaberia Isaac Kubai, Simon Thuranira Taaliu, and Kakai Shem Khakame. 2020. 'The Relationship between Agricultural Teaching Approaches and Food Security in Kenya'. *Education Research International* 2020:1–18. doi: 10.1155/2020/8847864.

Nyaboke, Roseline, Dovison Kereri, and Loice Kerubo Nyabwari. 2021. 'View of Competence-Based Curriculum (CBC) in Kenya and The Challenge of Vision 2030'. *International Journal of Education, Technology and Scienc* 1(4):155–69.

Nyaundi, L. 2021. 'Unemployed Teachers to Retrain for Nine Months to Be CBC Compliant.' *The Star*, 13.

Nzomo, Esther Mumbi. 2021. 'Attitude of Students Towards Selected Teaching Methods in Agriculture in Secondary Schools in Mukaa Sub-County of Makueni County, Kenya'. Masters Thesis, Egerton Unversity.

Ouma, Ouma, A. Toromo, S. Wanami, P. Waswa, S. Kabesa, J. Mubichakani, and K. Simiyu. 2021. 'Readiness for Competence Based Learning of Agriculture Education in Secondary Schools in Uasin Gishu County, Kenya'. *International Journal of Scientific*

and Research Publications (IJSRP) 11(4):22–30. doi: 10.29322/IJSRP.11.04.2021.p11204.

Samoei, Mary. 2020. 'Student Teaching Internship Experiences and Perceived Success of First-Year School Based Agricultural Education (SBAE) Teachers'. A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Agricultural and Extension Education, University of Arkansas, United States of America.

Shiundu, Linda. 2021. 'Gov't to Revive 4K Clubs in Schools to Boost Food, Nutritional Security'. *Tuko*. Retrieved 3 January 2022 (https://www.msn.com/en-xl/africa/kenya/govt-to-revive-4k-clubs-in-schools-to-boost-food-nutritional-security/ar-BB1e4mSZ).

Waiganjo, Mary. 2021. 'Relationship between Selected Teacher, Institutional and Curriculum Factors and Teaching Approaches Used by Agriculture Teachers in Public Secondary Schools in Nakuru County, Kenya.Pdf'. A Thesis Submitted to the Graduate School in Partial Fulfillment of the Requirements for the Doctor of Philosophy Degree in Agricultural Education, Egerton Unversity, Njoro.

Wale, Bantalem Derseh, and Kassie Shifere Bishaw. 2020. 'Effects of Using Inquiry-Based Learning on EFL Students' Critical Thinking Skills'. *Asian-Pacific Journal of Second and Foreign Language Education* 5(1):9. doi: 10.1186/s40862-020-00090-2.