Agricultural Teaching Approaches Employed in Secondary Schools for Food Security: a case of Embu County, Kenya

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Abstract
The purpose of the study was to establish the agricultural teaching approaches employed in secondary schools for food security. The research findings revealed that the agricultural teaching approaches employed in Kenyan secondary schools are the lecture method, discussions, demonstrations, class experiment/projects, problem solving/guided discovery, and rarely field trips and tours. The commonly used methods are the lecture method and class discussions which have little contribution to skills development for food security. The study concludes that there is a lot of theory through lectures which need to be discouraged in agriculture classes. This is to enhance relevant skills development for food security in the country. Practical based approaches need to be incorporated and beefed up with discussions to enhance acquisition of knowledge and its transfer to the food industry.

Key words: agricultural teaching approaches; food security; skills development; skills transfer; theory; practical.

1.0: Introduction
Secondary agricultural education and training is expected to produce graduates with the requisite agricultural knowledge, skills and practice needed to meet the job market demand and to generate interest in farming leading to food security (Diise et.al, 2018). However, nearly one billion people around the world in both developed and developing countries and in urban and rural areas suffer from chronic food insecurity (Food and Agricultural Organization (FAO, 2018)). The report by FAO (2018) has also indicated that the number of hungry people in the world has risen for a third consecutive year to 821 million (or one in every nine people on the planet) in 2017 as compared to 804 million people in 2016.

The global demand for food is expected to increase dramatically while the growing world population and climate change are already affecting farming practices and productivity (United States Agency for International Development (USAID, 2018)). According to FAO (2018) this is a return to levels not seen in almost a decade ago which sends a clear warning that more must be done and urgently if the Sustainable Development Goal of Zero Hunger (SDG2) is to be achieved by 2030 (FAO, 2018).

Youths at secondary schools naturally possess good health, strength and vigour which they could exploit to their advantage to contribute in achieving food security in the society. This is supported by Saina, Kathuri, Rono, Kipsat and Sulo (2012) and can be realized by providing effective skill
training in agriculture at the secondary school level. There are numerous farming business enterprises that the skilled youth can engage in and contribute to the food security. These include aspects of crop production, livestock production, soil science, agricultural economics and agricultural engineering (Kenya National Examinations Council (KNEC, 2017)) both in the rural and urban areas. The approaches employed in teaching secondary agriculture should develop in the youth the skills in any of the above areas and contribute to food security.

The general youth population of today is lacking the knowledge and skills to grow their own food even at home. The square foot gardening technique, vertical gardening and patio container gardens address the lack of adequate skills to raise their own food but little has been done to address this issue (Diise et.al, 2018). The ability to plant a seed and grow your own food is a need for all people to be able to make the link between human beings and nature as a whole (Diise et.al, 2018). In finding effective solutions to dealing with the obvious skills gap of graduates of agricultural education even at secondary school level, research attention should be focused on investigating effective approaches of organizing teaching and learning of practical agriculture to ensure that graduate produced possess the needed skills (Diise et.al, 2018).

Teachers in secondary schools have been found to use the various pedagogical methods at their disposal in the various subjects. The most common methods are the lecture, discussions, class experiment/projects, demonstration, problem solving/guided discovery, and rarely field trips and tours. However, different teachers use different methods depending on the availability of facilities and resources as per the status of the institution (Munyao, 2014). According to (Miljan et. al, 2010) the teaching methods employed need to be designed in a way that the responsible teacher has the possibility to analyze all aspects of the knowledge acquired by the students.

Despite the intent of these approaches to impart knowledge and developing agricultural skills on the learners, developing skills geared towards food security remains a challenge. As cautioned by various scholars, developing the relevant skills for food security in a country should put an emphasis on practical approaches to teaching agriculture (Diise et.al., 2018; Deegan, 2016). If done without well outlined guidelines, transfer of knowledge may remain theoretical; examination oriented and with class projects restricted to the main examinations only. This has also has the effect of lack of interest and poor performance of students in agriculture. To arrest students’ attention, interest, curiosity and promote their performance, the use of activity stimulating and student-centered approach like demonstration method instead of depending on the conventional approach need to be embraced (Daluba, 2013).

In view of the current study, secondary agriculture in Kenya is being taught yet the country is still experiencing consistent food shortage to the levels of importing staple food. This research was therefore aimed at establishing the contribution of the agricultural teaching approaches in secondary schools in solving the problem of food insecurity. It was specifically concerned with establishing the agricultural teaching approaches employed in secondary schools for food security.

2.0: Literature Review

2.1: Lecture Method

Lectures usually take place in a classroom-format and are a common strategy teachers employ in the teaching of agricultural education. It is also referred to as talk and chalk or textbook method.
In the course of employing the method, the teacher dominated the teaching with very little participation on the part of the learners (Umar, 2012). Here the teacher is seen as the repository of all knowledge while the students are passive recipients of knowledge transmitted by the teachers in the learning process. The method has the advantage of covering a wider area within a short time but it is not student centered and students do not gain mastery of concepts (Umar, 2012).

Studies have outlined the major advantage of lecture method as the ability to get a huge amount of information to a lot of people in a short amount of time (Charlton, 2006). In the context of the current study, this method is the least effective in developing agricultural skills for food security. In many cases, lectures contain no form of interaction from the teacher to the student and can be quite boring (Seevers & Graham, 2012). Studies show that people only retain 20 percent of what they are taught in a lecture (Charlton, 2006). According to Seevers & Graham (2012) lectures are only useful when used in a conscious way. Properly structured-lectures may be the best teaching method for many subjects and many students, and lectures may be especially well-suited to the transmission of conceptual and systematic knowledge (Charlton, 2006).

In a study (Umar, 2012) indicated that a large amount of the topic can be covered in a single class period, use of this method exclude the use of any equipment or laboratory, learning material is not required, student listening skills developed, there is logical arrangement of the material in order to present it orally and helps to learn languages. Contrary to this (Umar, 2012) outlines the disadvantages of lecture method of teaching as teachers delivering the same lecture to students without recognizing the individual differences, language use in the lecture is above the standard of the students hence they are not able to get full advantage of the lecture. Lectures are often forgotten by the students soon after while learning is retained if activities are experienced and attention level is not the same for students listening to the lecturer (Umar, 2012).

Lectures are therefore usually the best medium for teaching up to the point where the student begins to specialize and train as a practicing scientist, at which point a more individualized and skill-orientated apprenticeship becomes necessary (Charlton, 2006). The current study therefore indicates that this method would be the least appropriate for teaching secondary school agriculture due to the lack of its ability to develop psychomotor skills needed for food security.

2.2: Discussion Method

Using discussions as a primary teaching method in agriculture allows the teacher to stimulate critical thinking on the learners (Umar, 2012). This approach also helps the teacher establish a rapport with the students; demonstrate an appreciation of their contributions at the same time challenging them to think more deeply and to articulate their ideas more clearly. The frequent questions asked by both the teacher and the students provide a means of measuring learning and exploring in-depth the key concepts of the course (Seevers & Graham, 2012).

Through discussion method, a set of acquired skills that is necessary for establishing and developing interpersonal relationships such as communication skills, cooperation, emotional intelligence are developed (Miljan et al, 2010). The current research advocates the incorporation of this approach to develop these skills. When linked to food security, students can have a clear picture of the likely causes, effects and mitigation measures of food insecurity in their homes, community and the nation at large.
2.3: Tours and Field Trips
Tours are a series of field and demonstration meetings arranged in a logical sequence (Seevers & Graham, 2012). A tour may be devoted to a specific topic or the cumulative effect of several result demonstrations (Seevers & Graham, 2012).

The usual purpose of outdoor training through tours and fieldtrips is to develop teamwork skills (Umar, 2012). In the context of the current study, agriculture students can benefit from such experiences by employing the team spirit in school-based and community projects. Such may include nursery practices and poultry projects from where they can sell the produce to both the school and the community making them food secure.

A key benefit in fieldtrip learning is the transfer of knowledge between students (Goh, 2011). Students with prior experiences share their knowledge with other students and the experiences serves to connect the group (Goh, 2011). Studies (Goh, 2011; Wong, 2008) have reported fieldtrips to have enhanced students’ learning and increased their practical knowledge.

Tours and field trips in secondary schools may however disorient the school time table hence need proper timing such as during the school mid-breaks and holidays. The field trip is one of the most complex and expensive activities in the educational system hence should be planned as an integral part of the curriculum rather than as an isolated activity (Orion & Hofstein, 1994). Based upon the model of experiential learning; which is a component of the constructivist theory, field trips can be an effective experiential learning activity (Roberts, 2006).
Figure 1.0: Cyclical and spiral experiential learning framework (Kolb’s 1984)

Experiential learning emphasizes the role that experience plays in the learning process, an emphasis that differentiates it from other learning theories. It defines learning as the process whereby knowledge is created through the transformation of experience (Kolb, 1984).

In the context of the current study, constructivist theory by Dewey (1998) fits in this approach because of the endless experiences learnt from the farm. Students are reconnected to local agriculture so that farms are no longer an abstract notion, they develop hands-on experience so that children can truly understand with all their senses just what it means to be on a farm (Goh, 2011). The researcher therefore advocates the incorporation of this approach through creation of adequate time and ensuring it becomes part of the project work done at form four in the final exam to gain more seriousness as it is being carried out.
2.4: Demonstration Method
Demonstration method refers to the type of teaching method in which the teacher is the principal actor while the learners watch with the intention to act later. Here the teacher does whatever the learners are expected to do at the end of the lesson by showing them how to do it and explaining the step-by-step process to them (Ameh, Daniel & Akus, 2007). The demonstration may include diagrams, charts, and other illustrative material accompanied by an oral explanation (Seevers & Graham, 2012). The audience observes the process, listen to the explanation, and pose questions during or at the conclusion of the demonstration (Seevers & Graham, 2012).

Such procedures may include machine milking, how to preserve fish, how to graft a mango tree or how to install drip irrigation in a home garden. In the context of the current study, incorporation of demonstration improves both recall and psychomotor skills when the students are allowed to repeat the same procedures either individually or as groups.

2.5: Class Projects
Agricultural projects seek to improve food security by diversifying a household’s resource base and facilitating the social and economic empowerment of women (Walingo, 2018). Several methods of classifying projects have been put in place; one approach has been to classify projects based on the purpose or outcomes while another approach has been to classify projects based on the actions of the learners rather than project outcomes (Roberts, 2007).

The project method is a teacher-facilitated collaborative approach in which students acquire and apply knowledge and skills to define and solve realistic problems using a process of extended inquiry (Howell, 2003). Class projects are therefore student-centered, following standards, parameters, and milestones clearly identified by the teacher. Project teaching method is based on the conviction that learning by doing, discussing in groups, and revisiting ideas and experiences are superior ways of gaining a better understanding of one’s environment (Diise, 2018). According to existing literature, practical work though class projects makes learning more enjoyable (Osborne & Collins, 2001; Jenkins & Nelson, 2005; Toplis, 2012).

The current study advocates class projects as an important part of an agricultural education that provides application of concepts taught in class. Students can hence transfer the acquired skills to their homes. For instance skills in breaking seed dormancy can be done in school and the student does the same when establishing a mango tree nursery which is an indication of sustainable food availability even for future generations. However, the purposes of projects in agricultural education have expanded beyond skill acquisition and proficiency to include personal development for diverse career preparation beyond agriculture (Roberts, 2007).

2.6: Problem Solving Approach/ Discovery Method/ Problem –Based Learning.
The problem solving approach is a student-centered approach to teaching where students participate in the learning process by contributing problems, analyzing the factors associated with the problems, developing possible solutions to the problems, placing the solution(s) into action, and evaluating the results of the solution (Olowa, 2009).
Problem-based learning (PBL) is a constructivist approach to instruction that revolves around a real-world, ill-structured problem (Burris and Garton, 2006). PBL promotes both the acquisition of
content knowledge and the development of thinking skills and strategies. Teachers typically take on the role of the facilitator and students become responsible for information learned. This method typically ends with a presentation of solutions and an evaluation of the process used in solving the problem.

When incorporated into secondary school agriculture, students develop an extensive and flexible knowledge base; develop effective problem-solving strategies; develop self-directed, lifelong learning skills; become effective collaborators; and become intrinsically motivated to learn (Vernon and Blake, 1993). There is agreement on the contribution of PBL to factors such as knowledge retention, student satisfaction, motivation, and critical thinking however; there is much less agreement on the role of PBL in knowledge acquisition (Vernon and Blake, 1993).

Studies have evidenced that PBL can help promote critical thinking skills among students and consistently display growth in problem-solving skills (Ball & Knobloch, 2004; Hmelo, 1998). PBL has been found to be effective in promoting higher-order thinking (Cockrell, Caplow & Donaldson, 2000; Dods, 1997; Vernon & Blake, 1993).

When incorporated into agriculture, the discovery method has been found to improve student motivation and interest (Herman & Knobloch, 2004; Gordon, et al., 2001; Norman & Schmidt, 1992). Students also indicate more satisfaction with PBL than with traditional methods of instruction (Ball & Knobloch, 2004; Gordon, Rogers, Comfort, Gavula & McGee, 2001; Cockrell, et al., 2000; Albanese & Mitchell, 1993; Vernon & Blake, 1993). However, controversy on the use of this approach is the existence of little empirical evidence as to what students are learning and how (Olowa, 2009; Hmelo-Silver, 2004; Dyer & Osborne, 1999). Problem solving instruction may not fit the learning style of some students because abstract learners may not recognize problems as such when presented to them. Future studies may require to investigate the use of constructivist problem-based approaches to determine effects on learning outcomes in agriculture classrooms.

3.0: Methodology
3.1: Location of study
The study was carried out in Embu County representing the forty seven counties in Kenya in regard to resource endowment, climatic conditions, rural versus urban areas, private versus public schools as well as diversity in population distribution. Such differences have an influence on the varied teaching approaches and their effect on skills development for food security.

3.2: Research design
The study adopted descriptive survey design where qualitative data was obtained. The study adopted the design because only opinions of the respondents on the agricultural teaching approaches employed in secondary schools for food security were being investigated.

3.3: Sampling procedures and sample size
The study applied mixed sampling methods where both random and non-random sampling designs were used. Embu County was purposively selected. Stratified random sampling was administered to obtain the number of schools required in the public and private school categories. Systematic random sampling was further applied to get the specific schools, as well as the agriculture teachers. Simple random sampling was carried out on the students in the selected schools. The researcher achieved this by obtaining the number of students specializing in agriculture in Form Three and Four from their subject teachers. However, the class registers from the class teachers in Form One
and Two were used to determine the students present. This was with the assumption that they would not have selected their subject options by the end of Form Two. The researcher then assigned random numbers to all the students to sample those who would take part in the study. The sample population is presented as table 1.0

Table 1.0: 
Population Sample

<table>
<thead>
<tr>
<th>Subject category</th>
<th>Target population</th>
<th>Actual sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public schools</td>
<td>186</td>
<td>60</td>
</tr>
<tr>
<td>Private schools</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Agriculture teachers</td>
<td>235</td>
<td>111</td>
</tr>
<tr>
<td>Students</td>
<td>46,340</td>
<td>490</td>
</tr>
</tbody>
</table>

3.4: Research instruments
An Agriculture Teachers’ Interview Schedule (ATIS) containing 18 questions was developed. These were distributed into seven open ended questions, six closed ended questions and five in likert scales. A Students’ Focus Group Discussion Guide (SFGDG) was also prepared with a set of fourteen open-ended questions which allowed students to speak freely and provide as much information as they knew. It is from these items that the question on the agricultural teaching approaches employed in secondary schools for food security was answered.

3.5: Pretesting the research instruments
The interview schedule and the focus group discussion guide were subjected to pre-testing. A pretest sample of 1% and 10% depends on the sample size, which is 1% for a large sample and 10% for a small sample (Mugenda & Mugenda, 2003). The researcher used 10% of the research participants to give a total of fourteen schools, two focus group discussion and fourteen interview schedules in the selected schools to participate in the pilot study. The randomly selected schools for piloting were not included in the actual study. The pilot data was used to compute the reliability coefficient of the instruments using the internal consistency approach.

3.6: Data collection procedures
A letter of introduction from the University of Embu helped the researcher obtain a research permit from the National Commission for Science, Technology and Innovation (NACOSTI). The researcher also obtained a consent letter from the county director of Education before contacting the school principals to prepare for data collection. The research instruments were administered over a span of three months where the interviews with the agriculture teachers were conducted. Within these months, the researcher also met the students in their focus group discussions. Two field assistants were involved recording the interviews and the discussions.

3.7: Data analysis
The edited data was coded and fed into the computer for analysis using the Statistical Package for Social Sciences (SPSS) version twenty four for windows. The researcher transcribed the audio data
from face-to-face interviews and the focus group discussions. The students’ and the agriculture teachers’ responses were read and re-read for proper interpretation. Content analysis was used to explain the qualitative data.

4.0: Results and Discussion
Research Question: What agricultural teaching approaches are employed in secondary schools for food security?
4.1: Agriculture teachers’ opinions on the teaching approaches employed in secondary schools
4.1.1: Percentage weekly use of each teaching approach identified
The researcher first sought to investigate from the agriculture teachers the various agricultural teaching approaches employed in secondary schools. Table 2.0 shows the agriculture teachers’ responses to this objective.

Table 2.0:
Agriculture teachers’ opinions percentage weekly use of each teaching method identified

<table>
<thead>
<tr>
<th>Teaching method</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion</td>
<td>98</td>
<td>31.9%</td>
</tr>
<tr>
<td>Demonstration</td>
<td>79</td>
<td>25.7%</td>
</tr>
<tr>
<td>Lecture</td>
<td>65</td>
<td>21.2%</td>
</tr>
<tr>
<td>Problem solving</td>
<td>35</td>
<td>11.4%</td>
</tr>
<tr>
<td>Class projects</td>
<td>30</td>
<td>9.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>307</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

A total of 98(31.9%) of teachers termed discussion as the most common teaching method used followed by demonstration 79(25.7%) whereas lecturing 65(21.2%) came in third. Other methods used were problem solving 35(11.4%) and class projects 30 (9.8%). Discussion, demonstration and lecture methods were commonly used in agriculture classes. This implies that the teacher had a higher control of the class. However, learners were not frequently exposed to problem solving and class projects. These two are better in developing agricultural skills which would be necessary for food security.

4.1.2: Percentage time spent with the students under each of the method identified
The researcher further sought to find out the percentage time spent with the students under each of the method identified. The descriptive statistics in table 3.0 shows the average percentage of time each approach took in teaching agriculture in a week.

Table 3.0:
Percentage weekly time spent on each of the methods employed

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Lowest</th>
<th>Highest</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturing agriculture</td>
<td>84</td>
<td>.50</td>
<td>80.00</td>
<td>36.0%</td>
<td>21.1</td>
</tr>
<tr>
<td>Discussion</td>
<td>101</td>
<td>10.00</td>
<td>90.00</td>
<td>33.7%</td>
<td>16.4</td>
</tr>
<tr>
<td>Demonstration</td>
<td>93</td>
<td>3.00</td>
<td>69.00</td>
<td>25.3%</td>
<td>14.3</td>
</tr>
<tr>
<td>Problem solving</td>
<td>54</td>
<td>2.00</td>
<td>50.00</td>
<td>20.9%</td>
<td>11.0</td>
</tr>
<tr>
<td>Class projects</td>
<td>56</td>
<td>.50</td>
<td>50.00</td>
<td>14.8%</td>
<td>9.9</td>
</tr>
</tbody>
</table>

The statistics in the table 3.0 reveals that lecturing agriculture (36.0%) took the biggest percentage of the allocated time for teaching agriculture followed by discussion at 33.7%, demonstration came
in third at 25.3% whereas problem solving was fourth at 20.9%. It is worth noting that class projects were given the least time (14.8%) yet students ought to carry out more projects and practical so as to put in practice the skills they had learnt in class. In this case therefore, problem solving and projects were both less frequently employed and also given least time among all other methods. This could be associated the minimal time available for teaching agriculture in the general school time table.

It was observed that some schools allocated lecturing of agriculture as high as 80% of allocated teaching time, others allocated discussion as high as 90% of the allocated time, the highest time that was allocated for demonstration was 69% while class projects and problem solving had an allocation of 50% of the teaching time. This implies that practical agriculture was least done and much time was spent on the theory work. Developing agricultural skills for food security requires hands-on-training as outlined by the competence based curriculum which would be possible through class projects and problem solving approaches.

4.1.3: Relative amount of time spent on class activities in an ideal forty minutes agriculture lesson

The study further sought to find out the amount of time spent on each of the teaching activity applied in a 40 minutes class. Table 4.0 shows the relative amount of time spent in various class activities in an ideal forty minutes lesson.

<table>
<thead>
<tr>
<th>Activity</th>
<th>N</th>
<th>Lowest</th>
<th>Highest</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher explaining to the whole class</td>
<td>108</td>
<td>10.00</td>
<td>80.00</td>
<td>35.2</td>
<td>16.9</td>
</tr>
<tr>
<td>Teachers giving notes</td>
<td>104</td>
<td>4.00</td>
<td>80.00</td>
<td>21.5</td>
<td>13.9</td>
</tr>
<tr>
<td>Whole class discussion</td>
<td>105</td>
<td>5.00</td>
<td>50.00</td>
<td>17.4</td>
<td>10.3</td>
</tr>
<tr>
<td>Students making their own notes</td>
<td>101</td>
<td>1.00</td>
<td>40.00</td>
<td>14.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Students doing practical activities in small groups</td>
<td>100</td>
<td>1.00</td>
<td>40.00</td>
<td>15.2</td>
<td>8.8</td>
</tr>
</tbody>
</table>

The study revealed that teachers explaining to the whole class took the highest percentage (35.2%) on average of the ideal 40 minutes set for teaching agriculture followed by teachers giving notes that took 21.5%, whole class discussion took 17.4% of the ideal 40 minutes whereas students doing practical activities in small groups took 15.2%. Finally, students making their own notes took the least percentages of the assigned 40 minutes for teaching agriculture (14.8%). Statistics in table 4.0 implies that teaching agriculture is mainly teacher-centered than student centered. Teachers do a lot in giving notes and explaining than students discovering and participating in practical activities. This could be attributed to the wide agriculture syllabus that needs to be covered within the stipulated time of three 40- minutes lesson a week in form one and two and four -40 minutes lesson in form three and four classes.

4.1.4: Importance of each approach in skills development for food security

The study further sought to find out rate at which each teaching approach developed skills for food security. Table 5.0 shows the agriculture teachers opinions on the importance of each approach in skills development for food security.
Table 5.0:
Agriculture teachers’ opinions on the importance of each approach in skills development for food security

<table>
<thead>
<tr>
<th></th>
<th>Most important</th>
<th>Important</th>
<th>Least important</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Lecture</td>
<td>16</td>
<td>14.8%</td>
<td>31</td>
</tr>
<tr>
<td>Problem solving/discovery</td>
<td>54</td>
<td>50.9%</td>
<td>36</td>
</tr>
<tr>
<td>Class project</td>
<td>56</td>
<td>52.3%</td>
<td>31</td>
</tr>
<tr>
<td>Demonstration</td>
<td>50</td>
<td>46.3%</td>
<td>49</td>
</tr>
<tr>
<td>Discussion</td>
<td>40</td>
<td>37.4%</td>
<td>58</td>
</tr>
</tbody>
</table>

A total of 56(52.3%) agriculture teachers positively felt that problem solving/discovery was the most important agriculture teaching approach that developed skills for food security followed closely by class projects as reported by 54(50.9%). Most teachers had neutral perception towards contribution of demonstration and discussion in developing skills for food security. It is worth noting that 61(56.5%) of teachers felt that lecturing was the least important teaching approach that developed skills for food security 61(56.5%). This implies that more emphasis should be put in problem solving/discovery and class projects as they were seen to contribute greatly in developing skills for food security. Relating to table 2.0, approaches that have the ability to develop skills for food security are ranked last in their use in schools. This leaves practical agriculture theoretically taught.

4.2: Students’ Opinions on the Agricultural Teaching Approaches employed for Food Security

The study was further interested in finding out the students’ opinions on the approaches they felt that their teachers were employing with the aim of developing skills in them for food security. The information was audio recorded and then transcribed for analysis.

4.2.1: School projects

Some schools were also reported to have been rearing fish, cattle, pigs and poultry. However, much work was left to the school grounds men to manage the enterprises. This could be attributed to inadequate time allocated to cover the entire agriculture syllabus. Hence, students could not effectively participate in the management practices. Others reported that students had Young Farmers’ Clubs (YFC) from where they could practice agriculture.

The researcher further sought to know the skills the students gained from the projects that were already established in their schools. Most of the students mentioned that the agricultural skills developed could be used to earn income which could further be used to produce or buy food. A number of students also mentioned that they had a chance to meet experts who would teach them some technical skills in agriculture like machine milking and seed inoculation and dressing. Others said that they had learnt of many challenges facing agriculture and how to solve them. For instance, poor postharvest practices such as storage problems which have always cost farmers on their harvest leaving them food insecure. A number of students further mentioned that the skills had made them more creative and innovative. For instance, some could grow vegetables in guinea bags and roof gutters where land was minimal making them food secure. Lastly, quite a number of students in their groups affirmed that doing things practically improves ones memory and critical thinking.
4.2.2: Tours and Field Trips
Further some students reported that their schools had sometimes allowed them to attend shows and incorporated field trips in teaching agriculture. A good number of students reported that their schools sometimes gave time for exploration and outside learning.

4.2.3: Students’ Opinions on specific approaches that may help them develop more skills for Food security
The researcher further sought to find out from the students the approaches that needed to be incorporated in learning for them to develop more skills for food security. Students were individually asked to highlight the most preferred approaches from a handout labeled B. There suggestions were as recorded in table 6.0.
A total of 391(42.0%) of the students recorded attendance of internship as the most critical approach. They felt that students should be attending internships for two weeks in an agricultural based institution to give them the required exposure and experience of the real world. This would not only prepare them for jobs in future but also help them continually develop skills for food security while in school; this would be equivalent to on-job-training.

<table>
<thead>
<tr>
<th>Specific approaches that students’ felt may help them develop more skills for food security</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students should be attending internships for around two weeks in an agricultural based institutions</td>
<td>391</td>
<td>42.0%</td>
</tr>
<tr>
<td>Greater commitment involving technical experts from agricultural institutions</td>
<td>318</td>
<td>34.2%</td>
</tr>
<tr>
<td>Increased instructional sessions through creation of adequate time for practical aimed at food security</td>
<td>221</td>
<td>23.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>930</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

A total of 318(34.2%) students felt that greater commitment in involving technical experts from agricultural institutions was necessary in schools as this would in turn add more and new skills to the students. Finally, 221(23.8%) of the students listed increased instructional sessions through creation of adequate time for practical agriculture as the third critical approach for success in agriculture aimed at food security. In agreement with the teachers’ views is the opinion that more time was needed for practical sessions and in depth learning. Majority of the work covered theoretically in lectures and giving notes would hence translate into problem solving and class projects paving way for more skills development for food security in secondary schools.

5.0: Findings
The agricultural teaching approaches employed in Kenyan secondary schools are the lecture method, discussions, demonstrations, class experiment/projects, problem solving/guided discovery, and rarely field trips and tours. Different teachers use different methods depending on the availability of facilities and resources as per the status of the institution. The commonly used methods are the lecture method and class discussions which have little contribution to skills development for food security. These findings are in agreement with those of (Umar,2012) who indicated that the only advantage to a lecture is the ability to get a huge amount of information to a lot of people in a short amount of time. It has been said to be the least effective of all training
methods. In many cases, lectures contain no form of interaction from the trainer to the trainee and can be quite boring.

Discussion method is highly effective in improving students’ achievement and retention than the conventional lecture method hence needs to be integrated with other teaching approaches. This is in tandem with findings by Falode, Adewale, Ilobeneke and Robinson (2015) who stated that using discussions as a primary teaching method allows you to stimulate critical thinking. Frequent questions, whether asked by the teacher or by the students, provide a means of measuring learning and exploring in-depth the key concepts of the subject.

Class projects, field trips and tours as well as demonstration methods were not commonly used in agriculture classes yet they were highly ranked in skills development for food security. The inadequate inclusion of these approaches to teaching and learning of agriculture was linked to inadequate time to cover the whole syllabus and lack of double lessons on the school timetables for practical work. In agreement with findings by Daluba (2013), demonstration method increase students' interest and understanding and consequently promotes high achievement rate.

The project method aligns with constructivism and its central precept that learners construct knowledge based on their experiences (Von Glasersfeld, 1995). The project method concurs with experiential learning theory, which asserts that learning occurs as a result of experiences held by the learner (Roberts, 2006; Kolb, 1984). This approach of teaching significantly help in improving agricultural students’ skills acquisition and technical competency which can be incorporated into food security aspects. This finding agrees well with the view of Anderman and Anderman (2006) that project method of teaching creates the learning environment which provides hand – on experience for students and its enable them to better understand and acquire the requisite knowledge and skills.

Problem solving method was rarely employed despite is potential to solve problems around the school and community. Students were not very conversant with this method. It is worth noting that neither the teachers nor the students mentioned integration of Information Communication and Technology (ICT) into Teaching Agriculture. More research is therefore necessary into the extent to which integration of ICT can enhance food security.

6.0: Conclusion and recommendations
This study sought to establish the agricultural teaching approaches employed in secondary schools for food security. The findings of the study revealed agricultural teaching approaches employed in Kenyan secondary schools are the lecture method, discussions, demonstrations, class experiment/projects, problem solving/guided discovery, and rarely field trips and tours. The study concludes that there is a lot of theory through lectures which need to be discouraged in agriculture classes. This is to enhance relevant skills development for food security in the country. Practical based approaches need to be incorporated and beefed up with discussions to enhance acquisition of knowledge and its transfer to the food industry.

The researcher however recommends the following for effective transfer of the skills to the food industry.
1) Secondary school teachers should be discouraged from the continuous use of conventional lecture method in the teaching of agriculture as the method does not develop any agricultural skills that can be applied for food security.

2) There is need to incorporate field attachments to students at form three and four over the holidays in agricultural based institutions for better skills development especially those geared towards food security.

3) Education policy makers to establish programmed school-community based projects as avenues for linking students to the real world and to enhance skills acquisition geared towards food security.

4) Allocation of scheduled agriculture practical sessions on school timetables which are currently missing.

References


