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Perceptions of Teachers Towards The Integration of Adaptation Strategy Topics on Climate Change into Secondary School Agriculture Syllabus on The Strength of Relevance to Teaching Methods in Machakos County, Kenya

Stephen Kyalo Mutiso[1], Joash K. Kibett[2], Dr. James Obara[3]

[1]Egerton University Department of Agricultural Education and Extension, P.O. Box 536- 20115, Egerton, Kenya.

[2, 3]Kabiaga University, Department of Horticulture, P.O. BOX 2030-20200, Kericho, Kenya

Abstract: ***Secondary school agriculture syllabus was introduced in Kenya to equip learners with knowledge on the basic principles of farming. In the wake of the last quarter of the 20th Century, climate change became the single most challenge to the Worlds agriculture sector, the developing countries being the most vulnerable. To tackle the phenomena, each country ought to find appropriate solutions to secure its own agricultural production. In Kenya, lack of knowledge on climate change adaptations affects the agriculture syllabus in meeting its objectives, which in turn translates to a shortfall in response to the farmers needs. The problem that the study sought to investigate therefore was lack of empirical data on the perceptions of teachers towards integration of adaptation strategy topics on climate change into secondary school agriculture syllabus on the strength of relevance to teaching methods in Machakoes County. The purpose of the study, therefore, was to investigate the perceptions of teachers towards the integration of adaptation strategy topics on climate change into secondary school agriculture syllabus on the strength of relevancy to teaching methods. The design of the study was descriptive survey research design. The target population was three hundred and fifty (350) agriculture teachers in public secondary schools in Machakos County. A sample of a hundred (100) agriculture teachers was selected through proportionate stratified random sampling technique. A structured questionnaire was used to collect data from the respondents. The objectives of the study were analyzed using frequencies and percentages. The main conclusion drawn from the study is that, the teacher's verdict on integration of adaptation strategy sub-topics of climate change into agriculture syllabus with respect to their relevance to available teaching methods confirmed a significant worth to embrace them. The major recommendation drawn from the study was that, the secondary school agriculture education is a precursor to the agriculture sector, as it translates to equipping people with desirable agro-technical skills, knowledge and attitudes that enhance their livelihoods.***

Keywords: Perception, Integration, Climate change adaptation, Secondary school agriculture syllabus, Agriculture teachers, Climate change, teaching methods

1. Introduction

Agriculture education is a fundamental tool in the development of agriculture sector, a key pillar of the Kenya's economy (Wanyama & Chang'ach, 2013). The sector contributes directly about 24 per cent of Gross Domestic Products (GDP) and about 19 per cent of the formal wage employment (Lewa and Ndungu, 2012). An estimated 60 per cent of all households in the country are engaged in farming activities and 84 per cent of rural households keep livestock. The sector also indirectly contributes a further 27 per cent to the country's Gross Domestic Product (GDP) through linkages with agro-based industries. According to Jinzun and Young gong (2004) agriculture curriculum is crucial in achieving both education for all (EFA) goals and the millennium development goals (MDGs) for eradicating extreme poverty, hunger, promoting gender equity, and ensuring environmental sustainability. Increasingly, climate change is becoming a challenge to agricultural production because it increases risks and uncertainties for farmers (Government of Kenya (GOK, 2013). Paradoxically, agricultural productivity is expected to play a critical role in circumventing the climate change phenomena as Kenya envisages its transformation into a rapidly industrializing, middle-income nation by the year 2030. This is because agriculture provides carbon sink function in plants through photosynthesis, agricultural soils, and production of renewable energies, an alternative from high carbon fossil fuels (Rural 21, 2010). The role of secondary school agriculture syllabus is to provide education to cater for the basic principles of farming (Oluoch, 1982; Kenya Institute of Education (KIE), 1985, 1992, 2002, 2004 & 2008). The syllabus addresses itself to two fundamental objectives. First, to predispose learners to the basic principles relevant to agricultural production and, second to involve them in various practicals and projects to reinforce skills and abilities necessary in the day to day production in various agricultural enterprises (KIE, 2008). The general objectives of the agriculture course aim to: promote agricultural activities which enhance environmental conservation; reinforce interest in, and awareness of opportunities existing in agriculture; create awareness of the role of agriculture in industrial and technological development; and enhance understanding of the role of technology and industrialization in agricultural development. Other objectives are; promotion of consciousness of healthy promoting activities in agricultural production; provision of a background for further studies; development of an

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occupational outlook in agriculture; and ensuring that schools take an active part in rural development by integrating agricultural activities in the entire curriculum (KIE, 2008).Since 1963, secondary school syllabus has undergone several reforms in an effort to make it relevant to the needs and emerging issues in the society. The vulnerability of agriculture sector to climate change and variability is one such emerging issue threatening not only Kenyan agriculture but also the world agriculture today (Intergovernmental Panel for Climate Change IPCC, 2010). Secondary school agriculture is therefore expected to inculcate values, attitudes, knowledge as well as practical skills in learners needed to counter climate change and variability effects. Konyango (2010) observes that, a well structured secondary school agriculture course must be responsive to the needs of the learners and the wider society. In order for agriculture syllabus to remain compliant to the learners needs, constant reviews are inevitable. A review refers to an ongoing process, constant and unavoidable. It might be uncomfortable to the stakeholders, and have its shortcomings, but as observed by Covington and Dobbins (2004), Laauwen (2004), Maguire (2000) and Wallace (1997), agricultural education particularly at secondary school level must adopt strategies for change so as to remain focused and address emerging issues pertinent to agricultural production. The agriculture syllabus review and improvement has direct implications on the; scope and breadth of the syllabus content, teaching resources, teaching methodologies and the broad and specific objectives. Therefore any attempt geared towards agriculture syllabus review must involve the agriculture teachers who constitute the key curriculum implementers (Crossely, 1984; Hust, 1981b & Watson, 1988 cited by Konyango, 2010). This is a view shared by U.S. Department of Education (1992; 1996 & 1999, also cited by Konyango, 2010), which lays emphasis on the success of the teaching of vocational agriculture on the quality and competency of agriculture teachers. Konyango, (2010) specifically single out agricultural education which he say has seen no significant change in methods of teaching for over eighty (80) years. At one time the emphasis was on gardening, while at later times it became too much theoretical. The task facing the agriculture teacher is therefore to teach his students not only to pass examinations but also to be able to and willing to transfer the knowledge and skill learned to productive labour. How he/she is going to achieve this depends on his professional training as a teacher and the opinions he/she upholds in view of the emerging issues revolving around agriculture education and its goals. The agriculture syllabus content broadly covers principles of; crops production, livestock husbandry and soil science. Other areas covered are; agricultural economics and agricultural engineering. Agricultural skills and knowledge are recommended to be taught both theoretically in a formal classroom setting and practically in a school farm/laboratory by professionally qualified teachers (KIE, 2008). Strong scientific evidence indicates that, the drifting climate change and variability pose a serious environmental concern for agriculture production today, than ever before (IPCC, 2010). A problem that, the secondary school agriculture education is presumed to curtail and sustain in Kenya. It is expected that, if a significant breakthrough in agriculture education at secondary school will be made, it will first have to review the syllabus in an attempt to adjusting it to respond to the climate change and variability phenomena. However, there can be no meaningful breakthrough in the agriculture syllabus appraisal if the agriculture teachers are not allowed to participate in it whether in part or exclusively as their views, opinions, perceptions feelings and attitudes form the basis upon which this study was based. Despite agricultural production being highly sensitive to climatic conditions, climate change related topics are not quite adequately covered in the entire secondary school agriculture syllabus. For instance, out of a total of thirty three units constituting the agriculture syllabus, only one unit, scarcely addresses aspects of climatic variables particularly on rainfall, temperature, wind, humidity, and light. While only two, provide aspects tending to climate change adaptations in particular, water supply, irrigation and drainage, and risks and uncertainties in farming. Yet, two units provide pertinent information on aspects for mitigating impacts created by climate change, specifically use of organic and inorganic manures and fertilizers on farms, and soil and water conservation. Finally, two other units focus on aspects of cost reduction and sustainability strategies from climate change, like agro-forestry and harnessing clean energy from solar radiation, wind and biomass (KIE, 2008). Proportionately, these represent only a fifth of the entire secondary school agriculture syllabus course content, which translates to a significant shortfall in the agriculture syllabus to address climate change and variability issues. These few topics therefore, provide a credible background upon which integration of selected climate change topics into secondary school agriculture syllabus was based. A well designed secondary school agricultural education syllabus can turn out to become integral part of the concerted efforts to tackle climate change and variability through: i) preparing agriculture to reduce its own gas emissions; ii) enhance the carbon sink function of agricultural soils; and iii) contribute to production of renewable energies and bio-products (United Nations Development Program (UNDP, 2012). The World governments need not tell us what must be done at the individual level. But what they can do is to simplify the science of climate change so that every school leaver has an idea of how to rescue this earth for the future generations (Food Agricultural Organization (FAO, 2012). The concepts of climate change are simple if explained well, even though the science is multifaceted (Prasad, Ranghieri, Trohanis, Kessler & Sinha, 2009). Climate change by definition, refer to any change in climate overtime. Climate variability on the other hand refers to variations in the mean state and other statistics of climate on all sequential and spatial scales beyond that of individual weather events (Prasad, *et al.*, 2009). United Nations Population Fund (UNFPA, 2009) explains climate change as the variation of the earth's climate caused by atmospheric accumulation of greenhouse gases (GHGs) such as carbon dioxide and methane because of human activity. The European Commission Directorate-General for Agriculture & Rural Development (ECDGARD, 2008) further concur that, climate change is caused by high concentrations of greenhouse gases in the atmosphere, due to human activities that adds to the natural "greenhouse gases" thus increasing the earth's temperature. As asserted by Prasad *et al.* (2009), climate change is triggered by human-induced GHGs emissions which absorbs and re-emits infrared radiation. When pollution adds these gases to the

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earth's atmosphere, they trap more solar energy in our planet (like in a green house) warming the earth's surface and contributing to climate unpredictability. Studies on secondary agriculture curriculum, particularly by Onyango (1982); Kathuri (1990 and 1993) and Konyango (2010) have revealed inconsistencies in secondary school agriculture teaching approaches, where at one time the emphasis is on practicals, and at another time theory. However, the main objective remains striking a balance between helping the students not only to pass examinations but also to acquire a motivation to transfer the skills and knowledge learned to productive labour. Therefore, despite the scientific explanation of climate change and variability being too wide in scope and too complex to explain in simple language, secondary school agricultural education was presumed to be the vehicle to transmit skills and knowledge useful in circumventing the susceptibility of agriculture from emerging issues including climate change and variability (GOK, 2013). The adaptations to climate change can be achieved through integration of selected climate change topics in secondary school agriculture syllabus on the strength of relevance to teaching methods. The methodology through which this was envisaged to be achieved was by creating an independent unit on climate change and variability and making the few aspects on climate change in the current syllabus fundamental parts of it. This was contemplated to be realized through reshuffling the identified aspects of climate change and variability into four key concepts/themes that is, introduction to climate change and variability, adaptations to climate change, mitigations of climate change and cost-reduction and sustainability strategies from climate change. The concepts/themes were addressed within the level and scope of understanding by the secondary school agriculture learners (Schneider, 2008). The study on "the perceptions of teachers towards the integration of selected adaptation strategy topics on climate change into secondary school agriculture syllabus on the strength of relevance to teaching methods in Machakos County" therefore sought to address the teachers' opinions to that effect.

2. Statement of the Problem

Research on secondary school agriculture syllabus review and improvement has concentrated on, the agriculture variables like use of more motivating teaching methodologies, and reshuffling of the content arrangements to create better linkages among the subject units. Other variables studied have included annexing some content from the secondary agriculture syllabus that due to the changes in technology have rendered them archaic and the position of the agriculture teacher-student relationship in a rapidly changing society. Yet agriculture and the associated sectors that the agriculture education aims to develop through provision of basic principles of farming, have increasingly become susceptible to emerging issues particularly the rapidly changing climate. The problem that was investigated was the lack of documented studies that have touched on climate change topics in secondary school agriculture syllabus on the strength of relevance to teaching methods in Machakos County. The intriguing question remains whether, the secondary school agriculture syllabus on the strength of relevance to teaching methods could be reviewed to adapt and use any benefits from climate change and variability which makes agriculture susceptible. Lack of streamlining the agriculture syllabus on the strength of relevance to teaching methods to adequately tackle climate change translates to a shortfall in the agriculture subject's capacity to effectively tackle its key objectives.

3. Objectives of the Study

The objective of the study was to investigate:

i) The perceptions of teachers towards integration of adaptation strategy topics on climate change into secondary school agriculture syllabus on the strength of relevance to teaching methods in Machakos County;

4. Research Questions

i) What are the perceptions of teachers towards integration of adaptation strategy topics on climate change into secondary school agriculture syllabus on the strength of relevance to teaching methods in Machakos County?

5. Location of the Study

The study was carried out among agriculture teachers working in public secondary schools within Machakos County. The County is characterised by varying agro-climate zones ranging from zone I to VI, which represent high, medium and low agriculture potential areas prevalent in the entire country. Machakos County generally experiences a flourishing agricultural economy. As a result, most public secondary schools located in the County offer agriculture subject, as an alternative to business studies, French, drawing and design, electricity and building and construction among other technical displines. Therefore a majority of secondary schools in the County have well established agriculture departments and trained agriculture teacher(s). Geographically, Machakos County is located in the former Eastern Province of Kenya. It borders Embu County to the North, Kitui to the East, Makueni to the South, Kajiado to the South-West, Nairobi and Kiambu to the West and Murang'a and Kirinyang'a to the North-West. Machakos County comprises of eight Sub-Counties formerly Districts, including; Machakos, Athi-River, Kathiani, Kangundo, Matungulu, Mwala, Yatta and Masinga. The number of public secondary schools in Machakos County was three hundred and ten (310).

6. Methodology

The study employed a descriptive survey research design. The design was chosen because it generated the views, opinions, feelings and or perceptions of the target population on the subject matter under investigation. The study was carried out among agriculture teachers working in public secondary schools within Machakos County.The number of public secondary schools in Machakos County was three hundred and ten (310). The population under study comprised of all the trained secondary school agriculture teachers in public secondary schools. The total population of the study was three hundred and fifty (350) agriculture teachers employed by the Teachers Service Commission

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(TSC). The researcher identified this group of respondents because they were 'information rich' with respect to the purposes of the study (Gall, Borg, & Gall, 1996). Stratified random sampling technique was used to obtain a sample size of one hundred and five (105) agriculture teachers selected from the eight (8) sub-counties of Machakos County. Thirty percent (30%) of agriculture teachers were sampled from each sub-county to obtain a hundred and five (105) respondents for this study. According to Kathuri and Pals (1993), a sample size of a hundred (100) respondents is said to be ideal number for a survey research in social sciences. However, for the purpose of taking care of the attrition, the researcher sampled out 105 respondents for the study. The researcher relied on a structured questionnaire as the main tool for collecting data from the respondents. Questionnaires were deemed ideal for the study since it was concerned mainly with variables that could not have been directly observed such as views, opinions, perceptions and feelings of the respondents. Such information could best have been collected through use of questionnaires than the other alternative instruments (Gall *et al*, 1996). Quantitative data was collected from 100 respondents sampled from 310 public secondary schools in Machakos County. All the secondary schools offering agriculture subject and with TSC posted agriculture teachers were identified from each Sub-county. Eight (8) enumerators were used to conduct the interviews. Permissions to meet the agriculture teacher(s) were sought. The agriculture teachers who were present at the time of the visits were briefed about the exercise and their consent to participate was sought. Those who agreed to participate had their identification and mobile telephone contacts recorded in a writing pad and assured of the confidentiality of the information they were to supply in the questionnaire. They were then allowed to react to the briefing through asking questions where they needed further clarifications. Those who conceded to participate in the study were supplied with questionnaires to study, critically think about, and fill in the information they deemed appropriate in their own free time. Finally, they were later contacted via their cell phones on the appropriate day and time the filled questionnaires could be collected. The optimum time the respondents were allowed to fill the questionnaires was one week, however, those who requested additional time due to varied reasons were added an extra week. The return rate to the filled questionnaires was 97 percent. Since the sampled respondents were 105, the 97 percent return rate was enough to obtain the minimum required number that is 100 for quantitative survey research in social sciences as per Kathuri and Pals, (1993). The quantitative data obtained after data collection was synthesised through selecting and organizing it into topical themes and central ideas or concepts. Data analysis involved coding and classifying data (also called categorizing or indexing) into numerical values depending on the appropriate scales of measurements before keying it into a computer master data sheet for reorganization using Statistical Package for Social Sciences (SPSS) programme version 17.

7. Results and Discussions

Data on the perceptions of teachers towards integration of adaptation strategy sub-topics on climate change into secondary school agriculture syllabus with regard to imparting it using the agriculture teaching methodologies are presented in Table 1, followed by interpretations and brief discussions on each sub-topic.

Table 1: Adaptation Strategy Sub-topics to Climate Change in Relation to Agriculture Teaching Methodologies

Sub-topic	SD		D		U		A		SA	
	F	%	F	%	F	%	F	%	F	%
a) The meaning and importance of climate change adaptations	5	5	2	2	11	11	34	34	48	48
b) Adoption of adaptable crops and livestock	2	2	2	2	7	7	40	40	49	49
c) Adoption of modern technologies on farming	1	1	2	2	14	14	35	35	48	48
d) Adoption of bio-tech crops and livestock	4	4	8	8	23	23	33	33	32	32
e) Flexible approaches on farm production methods	2	2	5	5	17	17	33	33	43	43
f) Alternative sources of food	2	2	7	7	14	14	34	34	43	43
g) Diversification of farm enterprises	2	2	2	2	9	9	28	28	59	59
h) The concept of insurance schemes on crops and livestock	6	6	5	5	22	22	36	36	31	31
i) The concept of mixed farming, mixed cropping and intercropping	1	1	3	3	8	8	38	38	50	50
j) The concept of pre and post-harvest crop management	2	2	1	1	11	11	33	33	53	53

Key:
F – Frequency
% - Percent

a) The Meaning and importance of climate change adaptations

The findings on the perceptions of teachers towards the integration of the sub-topic on the meaning and importance of climate change adaptations in relation to teaching it by use of the convectional agriculture teaching methodologies are presented in Table 1a.

Table 1a: The Meaning and Importance of Climate Change Adaptations

Responses	Frequency	Percent (%)
Strongly disagree	5	5.0
Disagree	2	2.0
Undecided	11	11.0
Agree	34	34.0
Strongly agree	48	48.0
Total	**100**	**100.0**

The results indicated that, a majority of the teachers (82%) either agreed or strongly agreed that, the sub-topic was

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relevant in terms of being taught using the agriculture teaching methodologies. However, (7%) of them disagreed or strongly disagreed to this suggestion, while (11%) of the teachers remained undecided. In this regard, most teachers supported the idea to integrate the sub-topic on the meaning and importance of climate change adaptations into secondary school agriculture syllabus. This finding was also predicted by the researcher as some climatic aspects influencing agricultural production are already covered in the principles of crops production but to a limited scope. The fact that, these climatic aspects are taught through the convectional agriculture teaching methodologies is a proof that, the meaning and importance of climate change if integrated into the agriculture syllabus will conveniently be taught using the available agriculture teaching methodologies.

b) Adoption of adaptable crops and livestock

The findings on the perceptions of teachers towards the integration of the sub-topic on the adoption of adaptable crops and livestock in the context of teaching it by use of the convectional agriculture teaching methodologies are presented in Table 1b.

Table 1b: Adoption of Adaptable Crops and Livestock

Responses	**Frequency**	**Percent (%)**
Strongly disagree	2	2.0
Disagree	2	2.0
Undecided	7	7.0
Agree	40	40.0
Strongly agree	49	49.0
Total	**100**	**100.0**

The findings revealed that, most teachers (89%) either agreed or strongly agreed that, the sub-topic was relevant to be taught by use of the familiar agriculture teaching methods. On the other hand however, (2%) of them disagreed or strongly disagreed to the submission, while (7%) of the teachers remained undecided. From the results analysis, majority of the teachers supported the idea to integrate the sub-topic on adoption of adaptable crops and livestock into secondary school agriculture syllabus. This finding was also predicted by the researcher as the concept is addressed in the agriculture syllabus though to an insignificant scope and breadth. Since this idea is taught through the convectional agriculture teaching methodologies, it goes without say that, this sub-topic if integrated into the agriculture syllabus will comfortably be taught using the available agriculture teaching methodologies.

c) Adoption of modern technologies on farming

The findings on the perceptions of teachers towards the integration of the sub-topic on the adoption of modern technologies on farming, in view to teaching it by use of the regular agriculture teaching methodologies are presented in Table 1c.

Table 1c: Adoption of Modern Technologies on Farming

Responses	Frequency	Percent (%)
Strongly disagree	1	1.0
Disagree	2	2.0
Undecided	14	14.0
Agree	35	35.0
Strongly agree	48	48.0
Total	**100**	**100.0**

The outcome indicated that, majority of the teachers (83%) either agreed or strongly agreed to the idea that, the sub-topic was viable in relation conveying it using the conventional agriculture teaching methods. Nevertheless, (3%) of them either disagreed or strongly disagreed to the proposition, while (14%) of the teachers remained undecided. Majority of the teachers supported the idea to integrate the sub-topic on adoption of modern technologies on farming into secondary school agriculture syllabus. This finding was expected by the researcher as the idea is also covered in the agriculture syllabus to a limited extend. In view of the fact that this concept is taught by the use of the locally available agriculture teaching methodologies, it is on the same strength that, this sub-topic if integrated into the agriculture syllabus will conveniently be handled using the same agriculture teaching methodologies.

d) Adoption of bio-tech crops and livestock

The findings on the perceptions of teachers towards the integration of the sub-topic on the adoption of bio-tech crops and livestock into agriculture syllabus for facilitation using the existing agriculture instructional methodologies are presented in Table 1d.

Table 1d: Adoption of Bio-tech Crops and Livestock

Responses	Frequency	Percent (%)
Strongly disagree	4	4.0
Disagree	8	8.0
Undecided	23	23.0
Agree	33	33.0
Strongly agree	32	32.0
Total	**100**	**100.0**

The outcome indicated that, most teachers (65%) either agreed or strongly agreed that; the sub-topic was suitable in view training it using the agriculture teaching methodologies. Of a different view though, (12%) of them either disagreed or strongly disagreed to the scheme, while a whooping (23%) of the teachers remained undecided. Majority of the teachers supported the idea to integrate the sub-topic on adoption of bio-tech crops and livestock into secondary school agriculture syllabus. This finding was anticipated by the researcher as the idea is relevant to the agriculture knowledge. Therefore with regard to this relevancy, the concept on adoption of bio-tech crops and livestock on farming is deemed fit to be taught by the use of the available agriculture teaching methodologies if integrated into the agriculture syllabus.

e) Flexible approaches on farm production methods

The findings on the perceptions of teachers towards the integration of the sub-topic on flexible approaches on farm production methods in view to facilitating it using the

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agriculture teaching methodologies are presented in Table 1e.

Table 1e: Flexible Approaches on Farm Production Methods

Responses	Frequency	Percent (%)
Strongly disagree	2	2.0
Disagree	5	5.0
Undecided	17	17.0
Agree	33	33.0
Strongly agree	43	43.0
Total	**100**	**100.0**

The findings indicated that, majority of the teachers (76%) either agreed or strongly agreed to the proposal. On the other hand though, (7%) of them either disagreed or strongly disagreed to the proposal, while (17%) of the teachers remained undecided. From the results analysis, majority of the teachers supported the idea to integrate the sub-topic on flexible approaches on farm production methods into secondary school agriculture syllabus. This finding was expected by the researcher as the concept is covered in the agriculture syllabus though to a limited extend. In view of the fact that this concept is taught by the use of the available agriculture teaching methodologies, it is on the same strength that, this sub-topic if integrated into the agriculture syllabus will handled using the agriculture teaching methodologies.

f) Alternative sources of food

The findings on the perceptions of teachers towards the integration of the sub-topic on alternative sources of food in an attempt to teach it using the usual agriculture teaching methodologies are presented in Table 1f.

Table 1f: Alternative Sources of Food

Responses	Frequency	Percent (%)
Strongly disagree	2	2.0
Disagree	7	7.0
Undecided	14	14.0
Agree	34	34.0
Strongly agree	43	43.0
Total	**100**	**100.0**

The findings indicated that, most teachers (77%) either agreed or strongly agreed that, the sub-topic was relevant to teach using the agriculture teaching methodologies. However, (9%) of them disagreed or strongly disagreed to the suggestion, while (14%) of the teachers remained undecided. Depending on the results analysis, most of the teachers supported the idea to integrate the sub-topic on alternative food sources into secondary school agriculture syllabus. This finding was anticipated by the researcher as the idea is applicable to the agriculture syllabus content. Therefore with regard to this applicability, the concept on alternative food sources is deemed ideal to be taught by the use of the available agriculture teaching methodologies if integrated into the agriculture syllabus.

g) Diversification of farm enterprises

The findings on the perceptions of teachers towards the integration of the sub-topic on diversification of farm enterprises on the strength to tackle it in classroom using the agriculture teaching methodologies are presented in Table 1g.

Table 1g: Diversification of Farm Enterprises

Responses	Frequency	Percent (%)
Strongly disagree	2	2.0
Disagree	2	2.0
Undecided	9	9.0
Agree	28	28.0
Strongly agree	59	59.0
Total	**100**	**100.0**

The findings indicated that, majority of the teachers (87%) either agreed or strongly agreed that, the sub-topic was relevant for handling using the agriculture teaching methodologies. Though, (2%) of them disagreed or strongly disagreed to the suggestion, while (9%) of the teachers remained undecided. In this regard, majority of the teachers supported the idea to integrate the sub-topic on diversification of farm enterprises into secondary school agriculture syllabus. This finding was expected by the researcher as the concept is also covered in the agriculture syllabus though to a limited extend. In view of the fact that this concept is taught by the use of the locally available agriculture teaching methodologies, it is on the same strength that, this sub-topic if integrated into the agriculture syllabus will handled using the same agriculture teaching methodologies.

h) The concept of insurance schemes on crops and livestock

The findings on the perceptions of teachers towards the integration of the sub-topic on the concept of insurance schemes on crops and livestock in view to teaching it using the conventional agriculture instructional methods are presented in Table 1h.

Table 1h: The Concept of Insurance Schemes on Crops and Livestock

Responses	Frequency	Percent (%)
Strongly disagree	6	6.0
Disagree	5	5.0
Undecided	22	22.0
Agree	36	36.0
Strongly agree	31	31.0
Total	**100**	**100.0**

The findings indicated that, most teachers (67%) either agreed or strongly agreed that, the sub-topic was appropriate to handle in an ordinary agriculture learning lesson using the agriculture teaching methods. Nevertheless, (11%) of them disagreed or strongly disagreed to the scheme, while whooping (22%) of the teachers remained undecided. As per the results, majority of the teachers supported the idea to integrate the sub-topic on the concept of insurance schemes on crops and livestock into secondary school agriculture syllabus. This finding was expected by the researcher as the concept is also covered in the agriculture syllabus though to a limited extend. In view of the fact that this concept is taught by the use of the available agriculture teaching methodologies, it is on the same strength that, this sub-topic if integrated into the agriculture syllabus will handled using the same agriculture teaching methodologies.

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i) The concepts of; mixed farming, mixed cropping and intercropping

The findings on the perceptions of teachers towards the integration of the sub-topic on the concepts of; mixed-farming, mixed cropping and intercropping in view to be taught by use of the usual agriculture teaching methodologies are presented in Table 1i.

Table 1i: The Concepts of; Mixed Farming, Mixed Cropping and Intercropping

Responses	Frequency	Percent (%)
Strongly disagree	1	1.0
Disagree	3	3.0
Undecided	8	8.0
Agree	38	38.0
Strongly agree	50	50.0
Total	**100**	**100.0**

The findings indicated that, a whooping (88%) of the teachers either agreed or strongly agreed that, the sub-topic was suitable to be facilitated via agriculture instructional methodologies. Nevertheless, (4%) of them disagreed or strongly disagreed to the proposition, while (8%) of the teachers remained undecided. On the basis of the results analysis, majority of the teachers supported the idea to integrate the sub-topic on concept of mixed- farming, mixed cropping and intercropping into secondary school agriculture syllabus. This finding was expected by the researcher as the idea is also covered in the agriculture syllabus though to a limited extend. In view of the fact that this concept is taught by the use of the locally available agriculture teaching methodologies, it is on the same strength that, this sub-topic if integrated into the agriculture syllabus will handled using the same agriculture teaching methodologies.

j) The concepts of; pre and post-harvest crop management

The findings on the perceptions of teachers towards the integration of the sub-topic on the concept of pre and post harvest crop management with regard to facilitate it by use of the existing agriculture teaching methodologies are presented in Table 1j.

Table 1j: The Concepts of; Pre and Post-harvest Crop Management

Responses	Frequency	Percent (%)
Strongly disagree	2	2.0
Disagree	1	1.0
Undecided	11	11.0
Agree	33	33.0
Strongly agree	53	53.0
Total	**100**	**100.0**

The findings showed that, majority of the teachers (86%) either agreed or strongly agreed that, the sub-topic was relevant to handle using the available agriculture teaching methodologies. However, only (3%) of them disagreed or strongly disagreed to the suggestion, while (11%) of the teachers remained undecided. From the results analysis, majority of the teachers supported the idea to integrate the sub-topic on the concept of pre and post harvest crop management into secondary school agriculture syllabus. This finding was anticipated by the researcher as the idea is applicable to the agriculture syllabus content. Therefore with regard to this applicability, the concept on alternative food sources is deemed ideal to be taught by the use of the available agriculture teaching methodologies if integrated into the agriculture syllabus.

8. Conclusions

The main conclusion drawn from the survey is that, the teacher's verdict on integration of adaptation strategy sub-topics of climate change into agriculture syllabus with respect to their relevance to available teaching methods confirmed a significant worth to embrace them.

9. Recommendations

The major recommendation drawn from the study was that, the secondary school agriculture education is a precursor to the agriculture sector, as it translates to equipping people with desirable agro-technical skills, knowledge and attitudes that enhance their livelihoods.

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