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Determination of Quality Assurance of Agricultural Education Lecturers in Soil Conservation for Effective Teaching of Students in Colleges of Education in North Central Nigeria

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Abstract

The study determined the quality assurance of Agricultural Education lecturers in soil conservation for effective teaching of students in colleges of education in North Central Nigeria. Three objectives guided the study, while three research questions were answered and three corresponding null hypotheses were formulated and tested at 0.05 level of significance. Survey research design was adopted for the study. The entire population of 239 respondents made up of 47 Soil Science lecturers, 26 Agricultural Education lecturers in all the public universities in North Central Nigeria and 166 Agricultural Education lecturers in all the fourteen public Colleges of Education in North Central Nigeria were used for the study. A 118 – item structured questionnaire titled: Quality Assurance of Lecturers in Soil Conservation Questionnaire (QALSCOQ) developed by the researcher from literature reviewed, was used to collect data from the respondents. Each QALSCOQ item was divided into two categories of required and performance. The required category had a 4 response options of Highly Needed (HN), averagely Needed (AN), Slightly Needed (SN) and Not Needed (NN). The performance category also had 4 response options of High Performance (HP), Average Performance (AP), Low Performance (LP) and No Performance (NP). The questionnaire items were face validated by five experts. The internal consistency of the questionnaire was determined using Cronbach alpha method and coefficients of 0.91 and 0. 93 were obtained for needed and performance categories respectively. 239 copies of the QALSCOQ were administered on the respondents with the help of five research assistants but only 229(95.81% copies of the QALSCOQ administered were retrieved and analyzed. Weighted mean and Need-Performance Index (NPI) were used to answer the research questions while chi-square statistic was used to test the null hypotheses at 0.05 level of significance. The findings of the study revealed that Agricultural Education lecturers are of low quality assurance in 48 measures in soil erosion prevention and 49 techniques in manure preparation and application and 21 practices on crop rotation techniques for effective teaching of students in Colleges of Education in North Central Nigeria. The study further revealed that Agricultural Education lecturers significantly possess low quality assurance in soil erosion prevention, manure preparation and application and crop rotation techniques for effective teaching of students in Colleges of Education in North Central Nigeria. Based on the findings of the study, it was therefore recommended amongst others that; Agricultural Education lecturers in Colleges of Education should utilize the findings to seek for sponsorship from their administrators in order to attend retraining programme for their capacity building in soil conservation.

Key Words: Agricultural Education, Soil Conservation, Lecturers, Teaching and Quality Assurance

Introduction

The need to impart knowledge and skills in agriculture to the younger generation emerged when the demand of agricultural produce by the consumers became greater than the supply by the farmers in the market in Nigeria. This condition forced the government to appreciate agriculture as an important sector of the Nigerian economy and saw its relevance to national development especially in the area of food sufficiency, generation of foreign exchange and its ever increasing role in providing employment opportunities for the unemployed persons in this country (Amonjenu, Asogwa & Iornenge, 2016). In recognition of the above benefits, the Federal Government of Nigeria through the National Commission for Colleges of Education minimum standards, incorporated soil and water conservation as a course content in the curriculum of Agricultural Education programme with the aim of training students on how to conserve soil and water resources to enhance food production for the sustenance of mankind.

Agricultural education is a specialized form of vocational education concerned with training learners to acquire desired competencies (knowledge, skills and attitudes) in all processes of agricultural production as well as in the technique for effective teaching of agriculture at all levels. Ukonze and Olaitan (2010) viewed agricultural education as a programme designed for equipping learners with knowledge, skill and attitudes in teaching and technical areas of agriculture to enable them impart same to students in schools and colleges. With reference to this study, agricultural education is a systematic process where lecturers who have been trained both in pedagogy and technical areas in soil science deliberately expose students to acquire desired knowledge, skills, attitudes, values and habits that will make them proficient in teaching soil conservation in schools. The Federal Government of Nigeria firmly recognize the need to continue to conserve soil resources in order to enhance food production for the sustenance of mankind. This is why soil science which include soil conservation as a course of study was introduced into the curriculum of agricultural education in schools and colleges of education.

Soil is a vast reservoir of living organisms and controls the global geochemical cycles. According to Dilip (2012), soil refers to the loose surface of the earth as identified from the original rocks and minerals from which it is derived through weathering processes. In the context of this study, soil is an accumulation of natural bodies which has been synthesized into profile forms from a diversified mixture of weathered unconsolidated minerals and decaying organic matter which covers the surface of the earth and which supplies, when containing the optimum amount of air and water, mechanical support and sustenance for plants. This suggests that the biophysical functions of soils are fundamental to the necessities of human life and play a central role in determining the quality of environment (Pla, 2014). Soil consists of four major components viz., mineral matter, organic matter, air and water which cannot be separated easily because they existsin an intimately mixed condition which encourages various reactions within and between the groups and gives optimum condition for crop growth. Soil contains about 50 % solid space and 50% pore space. The total solid space of the soil is occupied by mineral matter and organic matter by about 45% and 5% respectively while the total pore space is occupied by air and water on 50:50 bases in which 25% is air and 25% is water respectively (Dilip, 2012).

Soil conservation entails the process by which certain practices and technologies are applied to the soil to enable it retain and sustain its fertility so that it can continue to support crop growth and withstand being carried away by erosion and other geological agents of denudation. Soil and water conservation in the submission of Goetz (as cited in Ifeanyieze, 2012), is a planned management of soil resources to prevent exploitation, pollution, destruction or neglect and to ensure the continuous usefulness and sustainability of the soil for agricultural production by keeping it in a better state for future use. In the view of Osinem (2005), soil conservation is the holding of soil in place, maintaining or improving its fertility and increasing its capacity for sustaining production since there is no real evidence that man may one day detach his life from the soil that sustains him. Soil conservation in the opinion of Dudal (as cited in Nwankwo, 2009), is the promotion of optimum use of land and water resources according to their capacity so as to ensure the improvement and maintenance of the land on sustainable basis. In the context of this study, soil conservation is the prevention of soil loss from erosion or prevention of reduced fertility caused by over usage, acidification, salinization or other soil chemical contamination According to Sustainet (2010), conserving water makes it available for crops, livestock and domestic use over a longer period; controlling soil erosion improves crop and pasture yields; conservation measures improve the supply of fuel and forest products; they increase the value of the land; terraces make cultivating steep slopes easier and

makes more and better livestock fodder available. In recognition of the above benefits, the Federal Government of Nigeria through the National Commission for Colleges of Education minimum standards, incorporated AGE 324 (soil and water conservation) as a compulsory course content in the curriculum of colleges of education in order for citizens to be trained on how to conserve soil and water resources to enhance food production for the sustenance of mankind.

A College of Education according to National Policy on Education (as cited in Asogwa & Omeje, 2017),is a tertiary institution that prepares individuals as teachers within a-three year duration for teaching various subjects including agriculture in primary and junior secondary schools. The National Commission for Colleges of Education minimum standard (NCCE, 2012) stated the specific objectives of agricultural education programme as to; prepare graduates with the right attitude to, and knowledge/professional competence in vocational agriculture; produce teachers who will be capable of motivating students to acquire interest in and aptitude for agriculture; develop in the student teachers the appropriate communicative skills for effective transmission of agricultural information and skills to the student in the context of their environment; equip the student teachers with adequate knowledge and ability to establish and manage a school farm effectively and provide a sound background to enhance further academic and professional progression of the student – teachers. In order to achieve the stated objectives, NCCE prepared a minimum standard which contains the content of the curriculum and resource inputs required by the lecturers for implementation of the programme.

A lecturer according to Bakare and Owodunni (2011) is an individual who has been trained to teach courses to students in a College of Education. In the submission of Isiwu and Okonkwo (2013), a lecturer of agricultural education is someone who has gone through a teacher preparatory programme in the university and is responsible for imparting knowledge, skills and attitudes in agriculture to students in the subject. A lecturer in this study, refers to an individual who has been trained and has acquired competence both in pedagogy and technical areas of agriculture which enables him/her to deliver instructions to students in soil science in the university, Agricultural Education in the university and Agricultural Education at the Colleges of Education. Lecturers' competence refers to the knowledge, skills and attitude possessed by individual for effective delivery of instruction both theoretically and practically. It is believed that the level of competence of lecturers have great influence on the extent to which they discharge their duties in the Colleges. For instance, a lecturer of Agricultural Education in the College of Education delivers instruction to students and evaluates them for competence and mastery in relevant topics in Agriculture for the award of NCE. On graduation, the NCE holders are recruited for the purpose of teaching agriculture to students in Secondary and Primary Schools.

Teaching is a systematic process of transmitting knowledge, attitudes and skills to students in accordance with professional principles. In the submission of Molagun andTaiwo (as cited in Akuto, Aduloju, &Odeh, 2012), teaching is a process by which a teacher guides the learner in the acquisitions of knowledge, skills and attitude. The authors further enunciate that it is an attempt to help someone acquire or change some knowledge, skills, attitude, ideas or appreciation. Teaching occurs when one individual deliberately attempts to help another individual or a group of persons in performing or learning a specific activity or a concept. In this study, teaching is a systematic process of instruction in which a more experience person (lecturer) deliberately exposes the less experienced person (student) to a planned activity and opportunity to acquire desired knowledge, skills, attitudes, values and habits that will make them become proficient in delivering soil conservation techniques in schools.

It is however, regrettable because the competence of lecturers of Agricultural Education in teaching soil science components of the curriculum seems to be in question and may need quality assurance in it for effective teaching of students in Colleges of Education. This is because the study of Onipede (2013) found out that lecturers of Agricultural Education in Colleges of Education have low competence (47.10%) in teaching soil science courses to students in South-West, Nigeria. Similarly, Ibrahim (as cited in Ifeanyieze, 2012) found out that teachers of agriculture find it difficult to teach soil science to students in secondary schools and identified poor preparation of students by their lecturers in Colleges of Education as the influencing factor. This is because the quality of education that teachers receive will in turn determine the quality and quantum of reforms that they can inculcate in their students. This means that a competent teacher dispense good teaching which in turn produces good quality workforce that will work towards the achievement of the national goals. Conversely, the consequence of incompetent and poorly

trained agricultural education lecturers is the production of half-baked agricultural science teachers who cannot plan, organize, manage and implement policies in schools. To associate the low competence of the teachers of agriculture with their lecturers, the lecturers need assessment to determine what they possess technically in soil and water conservation and what they need to possess for quality assurance and effective delivery.

Quality assurance is all embracing efforts covering policies and actions through which the worth of higher education is determined and maintained. It refers to those actions that an educational institution undertakes to ensure that they provide required standard of education in order to produce quality manpower for national development (Ekele, 2019). According to Asogwa, Uko and Omeh (as cited in Asogwa &Lan, 2014), quality assurance is the practice of managing the way services are provided to make sure they are kept at high standard. Similarly, Alaribe, Ellah and Olaitan (2013) viewed quality assurance as the process of obtaining evidence that teachers are competent in implementing the content of a subject curriculum in schools. With reference to this study, quality assurance is the process of obtaining evidence on the technical and pedagogical competence of agricultural education lecturers in soil conservation for effective preparation of students in Colleges of Education in North Central, Nigeria. Such evidence could be ascertained through assessment of the lecturers in soil erosion prevention and control, manuring and crop rotation techniques which are the major indices of soil conservation.

Assessment is a fact finding processes aimed at providing useful information required for making relevant decision about a programme. In the submission of Barde and Denton (as cited in Eze and Asogwa, 2013), assessment is the process of gathering and discussing information from multiple and diverse sources in order to develop deep understanding of what students know, understand and can do with their knowledge as a result of their educational experience. With reference to this study, assessment is the systematic fact finding process involving collection of data from lecturers of agricultural education in colleges of education and universities as well as soil science lecturers in universities to estimate the level at which the lecturers in colleges of education perform and the level they need to perform technically and pedagogically in all components of soil conservation for effective delivery to their students. Proper assessment establishes need gap index that sometimes exposes weaknesses that may require the lecturers to embark on quality assurance course to improve their competence in soil conservation.

Need gap according to Rosett and Sheldon (as cited in Asogwa, 2016) is the difference between the perceived need (real performance) and actual need (expected performance). The authors stressed that need gap is obtained by subtracting the present performance level (PPL) from the actual need level (ANL). Similarly, Berwick (as cited in Nwigwe (2009) considered need gap as the discrepancy between a current state of affair and a desired future state. The authors maintained that it is the difference that exists between perceived need and felt need. To determine the level of competence of the lecturers in determination of soil chemical properties as well as ascertain what they need to know more in order to be effective in teaching their students in Colleges of Education requires need gap analysis. Need gap analysis is described by Chuta (as cited in Asogwa, 2016) as a technique for determining the steps to be taken in moving from a current state to a desired future state. It begins with listing of characteristics factors such as competencies, performance level of the present situation, cross listing of the factors required to achieve future objective and then highlighting the gaps that exist and needs to be filled. The author recorded that need gap analysis is a tool that is used by a company or an individual, to compare its actual performance with its potential performance. In this study, need gap analysis is the computation of the mean values of the perceived performance of the lecturers subtracting from the computation of the mean values of their expected performance in soil and water conservation. The result obtained is the need performance gap index which indicates the quality assurance needs of the lecturers of agricultural education in soil conservation.

Statement of the Problem

The conservation of soil is key to agricultural production because soil plays a very significant role in plant growth. In recognition of this role, the Federal Government of Nigeria incorporated Soil Science which include soil conservation as a component of the curriculum of Agricultural Education in Colleges of Education in order for citizens to be trained on how to conserve soil to enhance food production for the sustenance of mankind. Colleges of Education through stipulations of NCCE Minimum Standard, hire qualified lecturers to teach agriculture to students. It is however worrisome when previous studies of

Ibrahim (as cited in Ifeanyieze, 2012) and Onipede (2013) found out that lecturers of Agricultural Education in Colleges of Education have low competence (47.10%) in teaching soil science courses to students. In a verbal interaction between the researcher and twenty one teaching practice student teachers of Agriculture in seven Secondary Schools across North Central zone, the teachers expressed phobia about passing soil science courses while at the Colleges of Education let alone teaching it now to students in Junior Secondary Schools. The practicing teachers tactfully avoided teaching soil science components as recommended in the curriculum during instruction due to lack of competence to teach.

The result of the interaction leaves the researcher with the suspicion that the teaching practice teachers seems to lack the required competence to teach soil conservation techniques to the students because they were not adequately prepared by their lecturers in Colleges of Education. This is in line with a Latin proverb which says '*Nemo dat quod non habet'*, meaning that no one gives out what one does not have. This implies that the competence of lecturers of Agricultural Education in teaching Soil Science components of the curriculum in Colleges of Education in Nigeria including North Central zone is questionable, although there is no empirical facts in literature available to the researcher that specifically indicts or otherwise the quality assurance of Agricultural Education lecturers in the study area hence, the need to provide substantive empirical evidence in order to either exonerate or associate lecturers with the findings of Ibrahim, Onipede, the complaint of teaching practice student teachers from the interaction and the researcher's suspicion (of poor quality assurance) of Agricultural Education lecturers in soil conservation for effective teaching of students in Colleges of Education in North Central Nigeria became a desideratum.

Objectives of the Study

The main objective of this study was to determine the quality assurance of agricultural education lecturers in soil conservation for effective teaching of students in colleges of education in North Central Nigeria. Specifically, the sought seek to:

- determine quality assurance of agricultural education lecturers in soil erosion prevention and control for effective teaching of students in colleges of education;
- find out the quality assurance of agricultural education lecturers in soil manuring for effective teaching of students in colleges of education and
- Ascertain quality assurance of agricultural education lecturers in crop rotation for effective teaching of students in colleges of education.

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance

- Agricultural education lecturers do not significantly possess low quality assurance in soil erosion prevention and control for effective teaching of students in colleges of education in north central Nigeria.
- Agricultural education lecturers do not significantly possess low quality assurance in soil ma for effective teaching of students in colleges of education in north central Nigeria.
- Agricultural education lecturers do not significantly require quality assurance in crop rotation for effective teaching of students in colleges of education in north central Nigeria.

Methodology

Three research questions and three null hypotheses guided the study. Survey research design was adopted for the study. The study area was north central Nigeria comprising of six states (Benue, Kogi, Nasarawa, Kwara, Niger, Plateau and the Federal Capital Territory, Abuja).The population for this study was 239 respondents made up of 47 soil science lecturers, 26 agricultural education lecturers in all the public universities in North Central Nigeria and 166 agricultural education lecturers in all the fourteen public Colleges of Education in North Central Nigeria (Office of the Heads of Departments of all Public Universities and Colleges of Education, 2021).There was no sampling as the study was a census survey of the whole population. This is because the population was small and was effectively be managed by the researchers. A 118- items questionnaire titled "Quality Assurance of Lecturers in Soil Conservation Questionnaire (QALSCOQ) was developed by the researchers from literature review and used for obtaining information from the respondents. The questionnaire (QALSCOQ) has two response categories of Needed and Performance. The needed category was be rated by soil science and agricultural education lecturers in all the public universities in North Central Nigeria because they are responsible for training agricultural education lecturers in colleges of education and hence sets the standard of

performance in all the indices of soil conversation while the performance category was rated by agricultural education lecturers in all the public colleges of education in North Central Nigeria since they have been implementing the agricultural education curriculum contents over time. Each QALSCQ item of the needed category has 4 rating scales of Highly Needed (HN), Averagely Needed (AN), Slightly Needed (SN), and Not Needed(NN) while each QALSCOQ item of the performance category has 4 rating scales of High Performance (HP), Average Performance (AP), Low Performance (LP), and No performance(NP) with corresponding nominal values of 4,3,2, and 1 respectively for both categories. The instrument was subjected to face and content validity by seven experts; two experts in Agricultural Education, three experts in soil science and two experts in Educational Test and Measurement, all from Federal University of Agriculture, Makurdi. The comments made by the experts was used to improve the instrument. The reliability coefficient of the instrument was obtained by using Cronbach alpha method and reliability coefficients of 0.91 and 0.93 was obtained for needed and performance categories respectively. The researchers and three research assistants visited the respondents in their schools and offices to administer 239 copies of the questionnaire on face to face bases with the guidance of heads of Department who helped in identifying the lecturers. This was to ensure that the actual individuals for whom the questionnaire is meant, is indeed the one who rates it. Also, it ensures that the researcher/ research assistants are available to explain any point that the respondents could not understand very well. A total of 229 copies representing 95.81 percent were filled and returned for data analysis.

The data was analyzed using both descriptive and inferential statistics. Descriptive statistics such as Weighted mean and Improvement Need Index (INI) was used to answer the research questions while inferential statistics of chi-square statistics was used to test the null hypotheses at 0.05 level of significance. The choice of mean to answer research questions is because data to be collected was on interval scale. The choice of chi-square on the other hand is because the study also sought to determine whether agricultural education lecturers in colleges of education would significantly require quality assurance in all the indices of soil conservation where the researchers wants to establish whether or not, an observed or actual performance (performance category) differs from a theoretical standard or expected performance (needed category). Hence the discrepancy or difference between an observed performance and the expected performance (standard) of agricultural education lecturers on various components of soil conservation was determined.

To determine the quality assurance of agricultural education lecturers in soil conservation in colleges of education in North Central Nigeria, the following steps were taken:

The weighed mean of each item under the needed category ($\bar{X}$n) was calculated.
The weighed mean of each item under the performance category ($\bar{X}$p) was calculated.
The difference between the two weighed means for each item ($\bar{X}$n – $\bar{X}$p) was determined to give the Need Performance Gap (NPG) which indicates the level at which quality assurance is needed.

Inference from the calculation is as follows:
Where the need performance gap (NPG) equals zero (0) for each item, the lecturers needed no quality assurance because the level at which the item was needed as indicated by the weighed mean is equal to the level at which the lecturers could perform that particular item.
Where the need performance gap (NPG) was negative (-) for each item, the lectures needed no quality assurance because the level at which the item was needed is lower than the level at which the lecturers could perform that particular item.
Where the need performance gap (NPG) is positive (+) for each item, the lecturers needed quality assurance because the level at which the item was needed is higher than the level at which the lecturers could perform that particular item.

The decision rule for rejection or otherwise of hypotheses was based on the p-value and alpha value. A hypothesis of no significant requirement was not rejected for any cluster of item whose p-value was equal to or greater than alpha value of 0.05($p \geq 0.05$) while it was rejected for any cluster of item whose p-value is less than alpha value of 0.05 ($p < 0.05$).

Results

The results of the study were obtained through analysis of data on research questions and hypotheses as follows:

Research Question 1

What is the quality assurance of agricultural education lecturers in soil erosion prevention and control for effective teaching of students in colleges of education?

Table 1:Quality Assurance of Agricultural Education Lecturer in Soil Erosion Prevention and Control for Effective Teaching (n= 229)

S/N	Item Statement	$\bar{\bar{X}}_n$	$\bar{\bar{X}}_p$	NPI($\bar{\bar{X}}_n$ - $\bar{X}_p$)	Remarks
	Strip cropping				LQA
	Ability of Agricultural Education lecturers to:	3.82	2.02	1.80	
1	Lay out strip on long slopes subject to rill erosion	3.78	2.11	1.67	LQA
2	Construct field strip not wider than 30m and narrower than 15cm	3.79	1.97	1.82	LQA
3	Establish crops in strips at right angles to the direction of water flow or cultivate across the slope rather than within	3.77	2.17	1.60	LQA
4	Plant crops at right angle to the prevailing wind	3.73	2.19	1.54	LQA
5	Establish rough soil surface during tillage	3.71	2.18	1.53	LQA
6	Adopt minimum tillage or zero tillage as they reduce erodibility	3.77	2.17	1.60	LQA
7	Break the soil clods moderately in order to avoid excessive damages to soil granules	3.82	2.02	1.80	LQA
	Maintenance of soil vegetation cover				
	Ability of Agricultural Education lecturers to:				
8	Plant cover crops such as Pueraria and Mucuna in pure stands on an uncultivated piece of degraded land.	3.67	2.18	1.49	LQA
9	Plant cover crops in association as a relay with an annual crop such as maize	3.62	2.19	1.43	LQA
10	Plant close-growing vegetation/grasslands such as carpet grass or Bahama grass	3.69	2.24	1.45	LQA
11	Plant tree crops such as oil palm (*Elais guinensis*), *Gmelinaarborea*, *Acacia albida* and other shade growing trees	3.71	2.25	1.46	LQA
	Terracing				
	Ability of Agricultural Education lecturers to:				
12	Plant crops on flat areas created on hillsides in a step-like formation	3.52	2.24	1.28	LQA
13	Use terraces on steep sloped farmlands to reduce soil movement along slopes	3.55	2.15	1.40	LQA
14	Construct the terrace by excavating soil from centre and throwing it to each side to form the bank	3.52	2.23	1.29	LQA
15	Construct a diversion channels to take away run-off water from the land	3.57	2.24	1.33	LQA
16	Plant grasses along the diversion channels to prevent under wash	3.63	2.22	1.41	LQA
	Contour Farming				
	Ability of Agricultural Education lecturers to:				
17	Plant in row patterns that run across slopes rather than along the slopes	3.56	2.21	1.35	LQA
18	Plough on the contour	3.44	2.18	1.26	LQA
19	Plant on the contour	3.73	2.22	1.51	LQA
	Contour bunds				
	Ability of Agricultural Education lecturers to:				
20	Divide the entire farm into several small parts to reduce the effective slope length of area.	3.72	2.24	1.48	LQA
21	Use contour bunds in low rainfall areas	3.74	2.22	1.52	LQA
22	Stabilize contour with vegetation to withstand period of heavy storms	3.73	2.24	1.49	LQA
23	Prepare ridges in spiral forms in sloppy (hilly) areas to restrict rapid movement of water in the farm	3.63	2.21	1.42	LQA
	Gully control				
	Ability of Agricultural Education lecturers to:				
24	Establish diversion structures that would make water to flow along a desired path and away from areas at high risk for erosion.	3.60	2.19	1.41	LQA
25	Fill in gullies with sand	3.57	2.31	1.26	LQA
	Grass Waterways				
26	Plant grass on the eroded areas where it will grow over and cover the surface	3.67	2.30	1.37	LQA
27	Establish grasses like vertivar that have the ability to withstand heavy storm and strong wind	3.84	2.32	1.52	LQA
	Tunneling				
28	Build tunnels in form of large exit pipes or joined ringed concrete	3.69	2.29	1.40	LQA
29	Construct deep pathways for diverting running water and channel them into exit pipes or tunnels	3.67	2.31	1.36	LQA
30	Plant vertivar grasses along the outlet to prevent under wash	3.60	2.28	1.32	LQA
	Green Manuring				
31	Grow green manure crops and bury them upon flowering in places affected	3.66	2.28	1.38	LQA

	by erosion				
32	Turn into the soil green leaves and tender green twigs collected from shrubs and trees grown on bunds, waste lands and nearly forest area	3.64	2.26	1.38	LQA
	Crop Rotation and Fallow				
33	Practice crop rotation with leguminous cover crops in sequence	3.71	2.29	1.42	LQA
34	Allow part of the farmlands to lay 'un-used' (fallow) after a few years of intensive use	3.60	2.31	1.29	LQA
35	Include a cultivated row crop densely planted, small grain and a spreading legume	3.49	2.31	1.18	LQA
	Mulch Farming				
38	Avoid clean clearing of the vegetation	3.29	2.22	1.07	LQA
	Crop Rotation and Fallow				
33	Practice crop rotation with leguminous cover crops in sequence	3.71	2.29	1.42	LQA
	Conservation Tillage				
39	Practice appropriate tillage (either reduced minimum tillage, no-till, direct drill, mulch tillage, stubblemuch farming or trash farming)	3.29	2.13	1.16	LQA
40	Ensure that about 75% of the soil surface is covered by vegetation	3.21	2.13	1.08	LQA
	Inter Planting				
41	Practice intercropping such as seeding of grasses/legume crops in combination of maize or other crops	3.26	2.09	1.17	LQA
42	Practice taungya farming	3.55	2.11	1.44	LQA
	Deep ploughing				
43	Avoid heavy tillage implements that can compact the soil	3.41	2.25	1.16	LQA
44	Avoid over-grazing which is capable of compacting the soil	3.05	2.19	0.86	LQA
45	Occasionally practice deep ploughing after crop harvest to improve the infiltration capacity of the soil so as to reduce runoff and soil loss	2.63	2.01	0.62	LQA
	Sand Bagging and Land Refilling				
46	Fill and align sand bags at some peak runoff areas with a view to diverting the water from entering a farmers' field	3.58	1.80	1.78	LQA
47	Use appropriate land re-filling materials (soil materials, solid wastes, corn stalks, and other crop residues) so that the rills or gullies developed could stabilize and heal	3.36	2.28	1.08	LQA
48	Use large rocks or concrete pavers on shore lines to control erosion	3.29	2.16	1.13	LQA
	Grand NPI	**3.57**	**2.21**	**1.36**	**LQA**

$\bar{X}_n$ = Mean of Needed Category, $\bar{X}_p$ = Mean of Performance Category, n = number of respondents, NPI = Needed-Performance Index, LQA = Low Quality Assurance

Data in Table 1 reveals that all the 48 items have need-performance index that range from 0.62 to 1.82, with a grand index of 1.36 and were positive. This result indicates that the the quality assurance of Agricultural Education lecturers in all the 48 items on soil erosion prevention and control for effective teaching of students in colleges of education in North Central Nigeria is low.

Hypothesis 1

Agricultural Education lecturers do not significantly possess low quality assurance in soil erosion prevention and control for effective teaching of students in colleges of education in North Central Nigeria. The data for testing hypothesis 1 is presented in Table 2.

Table 2: Chi-Square Test of Significance of Quality Assurance of Agricultural Education Lecturer in Soil Erosion Prevention and Control for Effective Teaching of Students in Colleges of Education

	Df	$\chi 2\alpha$	Sig.	Alpha Level	Remark
Pearson Chi-square	58	381.354[a]	0.000	0.05	S, R
Number of Observation	229				

Df = degree of freedom, $\chi 2\alpha$ = chi-square calculated, Sig. = P-value; P < .05, S= Significant, R= rejected

Table 2 shows a p-value of 0.000 which is less than the alpha value of 0.05 at 58 degrees of freedom (i.e 0.000 < 0.05; df = 58). This indicates that the test is statistically significant, implying that Agricultural Education lecturers significantly possess low quality assurance in soil erosion prevention and control for effective teaching of students in colleges of education in North Central Nigeria Therefore, the null hypothesis, was rejected.

Research Question 2

What is the quality assurance of Agricultural Education lecturers in manure preparation and application for effective teaching of students in colleges of education in North Central Nigeria?

The data for answering research question 2 is presented in Table 3.

Table 3: Quality Assurance of Agricultural Education Lecturers in Manure Preparation and Application for Effective Teaching (n= 229)

S/N	Item Statement	$\bar{\bar{X}}_n$	$\bar{\bar{X}}_p$	NPI($\bar{\bar{X}}_n$ - $\bar{X}_p$)	Remarks
	Farm Yard manure				
	Ability of Agricultural Education lecturers to:				
1.	House animals: goat, sheep, or poultry in appropriate pen	3.70	2.13	1.57	LQA
2.	Feed the chosen animal with grasses, legumes, water and other materials	3.29	2.33	0.96	LQA
3.	Source for suitable grasses and shrubs	3.58	2.13	1.45	LQA
4.	Cut the grasses and shrubs with cutlass	3.11	2.28	0.83	LQA
5.	Dry the grasses and shrubs	2.84	2.06	0.78	LQA
6.	Spread the dried grasses as beddings on the floor of the animal pen	2.81	1.90	0.91	LQA
7.	Place the animals on the beddings for them to defecate	3.08	1.89	1.19	LQA
8.	Collect animal dung and litter from the pen	2.93	2.03	0.90	LQA
9.	Replace the beddings after packing	2.92	1.95	0.97	LQA
10.	Heap the daily collected beddings together in a place	2.93	1.96	0.97	LQA
11.	Allow them to decay or Stock the materials under a shade during dry season	3.07	1.96	1.11	LQA
12.	Spread the beddings on the farm during rainy season	3.60	2.03	1.57	LQA
13.	Plough in the beddings where necessary	3.66	2.27	1.39	LQA
	Green manure				
	Ability of Agricultural Education lecturers to:				
14.	Select suitable plant part(s), crop seeds/ cuttings (leguminous crops before flowering is recommended)	3.58	2.30	1.28	LQA
15.	Prepare seed beds	2.67	2.28	0.39	LQA
16.	Measure out the quantity of seed to be sown per hectare	3.56	1.81	1.75	LQA
17.	Carry out seed viability test by soaking the seed in water for 5 minutes	3.56	2.26	1.30	LQA
18.	Discard floating seeds	3.29	2.26	1.03	LQA
19.	Broadcast seeds on the prepared beds	3.37	2.13	1.24	LQA
20.	Plant seeds or cuttings; spacing them closely or Plant larger seeds in rows between the rows of cereals	2.97	2.16	0.81	LQA
21.	Water the seed beds after planting	3.38	1.97	1.41	LQA
22.	Weed the plot regularly to reduce pests	3.56	2.17	1.39	LQA
23.	Plough in the crop distributing evenly over the farm just after it had flowered	3.36	2.26	1.10	LQA
24.	Leave at least 14 days interval before planting the next crop	3.55	2.16	1.39	LQA
	Composting				
	Ability of Agricultural Education lecturers to:				
25.	Select appropriate site for compost preparation	3.26	2.27	0.99	LQA
26.	Map out the position of seven pits using pegs	3.00	2.13	0.87	LQA
27.	Dig trenches or pits of about 1m deep in each plot mapped	3.27	1.98	1.29	LQA
28.	Label the pits as 1,2,3,4 or as A,B and C	3.12	2.14	0.98	LQA
29.	Provide wall or fence round the corners for security	3.66	2.04	1.62	LQA
30.	Put a starter in each pit	3.03	2.31	0.72	LQA
31.	Add grasses, leaves and lawn chippings to the pits	2.88	2.00	0.88	LQA
32.	Spray urine, wood ash, animal dung or a head pan/bucketful of old compost on top of each layer or apply NPK fertilizer	3.84	1.92	1.92	LQA
33.	Water the grasses and ashes in the pits daily	3.77	2.36	1.41	LQA
34.	Repeat the above step until the pit is filled completely	3.74	2.34	1.40	LQA
35.	Force a tester into the pit with your hand	3.71	2.33	1.38	LQA
36.	Cover the pit with layers of refuse of 15-20cm	3.70	2.31	1.39	LQA
37.	Plaster/ cover to drive away files	3.69	2.36	1.33	LQA
38.	Allow materials to sink	3.63	2.33	1.30	LQA
39.	Feel the testing stick after the first day to know if it is hot, cold, damp, or moist.	3.64	2.35	1.29	LQA
40.	Turn pit 1 and 2 to A and pit 3 and 4 to B	3.60	2.31	1.29	LQA
41.	Force a tester into pit A and B	3.66	2.33	1.33	LQA
42.	Remove the tester for examination after 2 weeks	2.84	2.32	0.52	LQA
43.	Turn pit A and B into C for storage	2.86	1.94	0.92	LQA
44.	Provide shade over the storage (content of pit C) to avoid evaporation	2.79	1.96	0.83	LQA
45.	Allow a waiting period of 1 month to decompose properly	2.82	1.94	0.88	LQA
46.	Pack the manure in a bag for easy transport to or within the farm	2.82	1.96	0.86	LQA
47.	Wear a hand glove to protect your hand from micro-organism in the manure	2.82	1.97	0.85	LQA
48.	Put desired quantity of the manure in your hand	2.77	1.95	0.82	LQA
49.	Apply using appropriate method like ring, band or spot application to crops	2.75	1.94	0.81	LQA
	Grand NPI	**2.67**	**2.13**	**1.13**	**LQA**

$\bar{\bar{X}}_n$ = Mean of Needed Category, $\bar{\bar{X}}_p$ = Mean of Performance Category, n = number of respondents, NPI = Needed-Performance Index, LQA = Low Quality Assurance

Table 3 reveals that all the 49 items have need-performance index that range from 0.39 to 1.92, with a grand index of 1.13 and were positive. This result indicates that the the quality assurance of Agricultural Education lecturers in all the 49 items on manure preparation and application for effective teaching of students in colleges of education in North Central Nigeria is low.

Hypothesis 2

Agricultural Education lecturers do not significantly possess low quality assurance in manure preparation and application for effective teaching of students in colleges of education in North Central Nigeria.

The data for testing hypothesis 2 is presented in Table 4.

Table 4: Chi-Square Test of Significance of Quality Assurance of Agricultural Education Lecturer in Manure Preparation and Application for Effective Teaching of Students in Colleges of Education

	Df	$\chi 2\alpha$	Sig.	Alpha Level	Remark
Pearson Chi-square	41	1062.362[a]	0.000	0.05	S, R
Number of Observation	229				

Df = degree of freedom,$\chi 2\alpha$ = chi-square calculated, Sig. = P-value; P < .05, S= Significant, R= rejected

Data presented in Table 4 shows a p-value of 0.000 which is less than the alpha value of 0.05 at 41 degrees of freedom (i.e 0.000 < 0.05; df = 41). This indicates that the test is statistically significant, implying that Agricultural Education lecturers significantly possess low quality assurance in manure preparation and application for effective teaching of students in colleges of education in North Central Nigeria Therefore, the null hypothesis, was rejected.

Research Question 3

What is the quality assurance of Agricultural Education lecturers in crop rotation techniques for effective teaching of students in colleges of education in North Central Nigeria?

To answer the above question, data on quality assurance of Agricultural Education lecturers in crop rotation techniques for effective teaching of students in colleges of education in North Central Nigeria was collected and subjected to analysis using Need-Performance Index as presented in Table 5.

Table 5: Quality Assurance of Agricultural Education Lecturer in Crop Rotation Techniques for Effective Teaching (n= 229)

S/N	Crop Rotation Techniques	$\bar{\bar{X}}_n$	$\bar{\bar{X}}_p$	NPI($\bar{\bar{X}}_n$ - $\bar{\bar{X}}_p$)	Remarks
	Ability of Agricultural Education lecturers to:				
1.	Determine the goals in view making a long range rotation plan	2.78	1.91	0.87	LQA
2.	Divide the field/farm into equal proportions based on the number of crops to be used in the rotation	2.74	1.95	0.79	LQA
3.	Ensure each crop in the rotation should be from a different family and species/feeding habits	3.53	1.92	1.61	LQA
4.	Decide on the sequence the crops should occur	3.29	2.17	1.12	LQA
5.	Decide on how many years or season each cycle of the rotation should run	3.25	2.10	1.15	LQA
6.	Make a list of crops to grow in the farm	3.18	1.99	1.19	LQA
7.	Group them (crops) together by plant family	3.34	2.01	1.33	LQA
8.	Ensure that the area cultivated to each crop is nearly the same year after year	3.27	2.18	1.09	LQA
9.	Create an acceptable planting schedule	3.36	2.17	1.19	LQA
10.	Draw a plot map of beds, ridges or mounds on a graph paper	3.55	2.19	1.36	LQA
11.	Ensure that in the map, the target crop (the main crop) is planted immediately after the legumes or fallow period	3.29	2.18	1.11	LQA
12.	Ensure that in the map, crops which are deep feeders alternate with shallow feeders	3.34	2.23	1.11	LQA
13.	Ensure that in the design, crops that are botanically similar or are likely to be attacked by the same diseases and pests should not normally follow each other in the rotation.	3.40	2.28	1.12	LQA
14.	Ensure that the number of years for which each cycle of the rotation is run is determined by the number of crops in the rotation, the length of their growing seasons and how frequent the farmer can grow the target crop without running into problems of disease and soil fertility	3.34	2.23	1.11	LQA
15.	Use the map to plan where to plant each crop	3.85	2.24	1.61	LQA
16.	Take note of crops that are to be grown and where on the map	3.77	2.29	1.48	LQA
17.	Label each crop with the year including the fallow in the rotation	3.79	2.27	1.52	LQA
18.	Implement the plan by planting specific crops in the mapped spaces	3.78	2.28	1.50	LQA
19.	Follow the planting schedule by planting the plants chosen in order of sequence	3.67	2.26	1.41	LQA
20.	Be consistent in order to obtain good results	3.67	2.25	1.42	LQA
21.	Keep records so that gains (or losses) in production can be ascertained	3.51	2.22	1.29	LQA
	Grand Index	**3.41**	**2.16**	**1.25**	**LQA**

$\bar{\bar{X}}_n$ = Mean of Needed Category, $\bar{\bar{X}}_p$ = Mean of Performance Category, n = number of respondents, NPI = Needed-Performance Index, LQA = Low Quality Assurance

Table 5 reveals that all the 21 items have need-performance index that range from 0.79 to 1.61, with a grand index of 1.25 and were positive. This result indicates that the the quality assurance of Agricultural Education lecturers in all the 21 items on crop rotation techniques for effective teaching of students in colleges of education in North Central Nigeria is low.

Hypothesis 3

Agricultural Education lecturers do not significantly possess low quality assurance in crop rotation techniques for effective teaching of students in colleges of education in North Central Nigeria.

The data for testing hypothesis 3 is presented in Table 6.

Table 6: Chi-Square Test of Significance of Quality Assurance of Agricultural Education Lecturer in Crop Rotation Techniques for Effective Teaching of Students in Colleges of Education

	Df	$\chi 2\alpha$	Sig.	Alpha Level	Remark
Pearson Chi-square	23	609.114[a]	0.000	0 .05	S, R
Number of Observation	229				

Df = degree of freedom,$\chi 2\alpha$ = chi-square calculated, Sig. = P-value; P < .05, S= Significant, R= rejected

Data presented in Table 6 shows a p-value of 0.000 which is less than the alpha value of 0.05 at 23 degrees of freedom (i.e .000 < 0.05; df = 23). This indicates that the test is statistically significant, implying that Agricultural Education lecturers significantly possess low quality assurance in crop rotation techniques for effective teaching of students in colleges of education in North Central Nigeria Therefore, the null hypothesis, was rejected.

Discussion of Findings

The findings of the study in Table 1 revealed that Agricultural Education lecturers have low quality assurance in all the 48 measures on soil erosion prevention and control. These measures are: Strip cropping, Maintenance of soil vegetation cover, Terracing, Contour Farming, Tunneling, Green Manuring, Crop Rotation and Fallow among others. The result from the corresponding hypothesis on Table 2 shows that Agricultural Education lecturers in colleges of education in North Central Nigeria significantly possess low quality assurance in soil erosion prevention and control. This finding agrees with Onu and Muhammed (2014) found out that farmers needed improvement on 37 cultural practices as: 10 competencies in mulching, 12 in cover cropping, 8 in strip cropping, 7 in contour farming and 45 mechanical field practice as follows: 10 competencies in contour bonding, 11 in terracing, 12 in channeling and 11 in tunneling for success in soil erosion prevention and control. This finding is also consistent with Omeh, Asogwa and Omeje (2017) who found out that crop farmers in Enugu State needed capacity building in 15 competency items in tillage, 11competency items in mulching, 10 competency items in cover cropping and 10 competency items in strip cropping for soil erosion management. Similarly, Ifeanyieze (2012) found out that teachers of Agricultural Education need improvement in 27(spread organic mulch over uncultivated land, make ridges across the slope, make cross bars between ridges, plant grasses on the land that is likely to be eroded and others) out of 43 skill items in soil erosion prevention and control for effective teaching of soil conservation in Colleges of Education in South East Nigeria. This might be why Okorafor, Akinbile and Adeyemo (2017) suggested control measures such as cultivation of vegetative cover, proper soil and water conservation practices, proper crop management techniques and intensive community based campaigns to minimize and control soil erosion and maintain soil quality. The above findings indicate that Agricultural Education lecturers would need to enhance their capacity both in agronomic and mechanical measures of soil erosion prevention and control to effectively teach their students on how to conserve the soil resources and maintain soil quality.

The finding of the study in Table 3 reveals that Agricultural Education lecturers in Colleges of Education in North Central Nigeria have low quality assurance in all the 49 practices in manure preparation and application. The practices in manure preparation and application practices where lecturers possess low quality assurance were: Farm Yard manure, Green manure and Composting. This result is further validated by the result from the corresponding hypothesis in Table 4 which shows that Agricultural Education lecturers in colleges of education in North Central Nigeria significantly possess low quality assurance in manure preparation and application techniques. This finding is in consonance with the results obtained by Asogwa and Lan (2014), that lecturers of Agricultural Education in colleges of education are of low quality assurance in 16 items in identification of organic materials used for composting manure, 14 items on aerobic method of composting manure and 22 items on anaerobic method of composting manure for mitigation of climate change mitigation in North Central, Nigeria. The

findings of this study also agrees with Ifeanyieze (2012) who found out that, teachers of Agricultural Education need improvement in all the 46 skills items identified in manure preparation and application for effective teaching of soil conservation in Colleges of Education in South East Nigeria. Some of the manure preparation and application skills according to the author were: farmyard manure (house animals like goat, sheep, poultry in pen, feed the animals with grasses, legumes, water and other materials among others; Compost manure (select appropriate site, map out and label seven plots or dig pits, provide compost materials, cut or shred the materials, build up heaps using grasses among others), Green manure (collection of seeds/cuttings, preparation of seedbeds, broadcasting the seeds on the prepared seedbeds, sowing the seeds or cutting on the beds, watering after planting and others).

The above findings are also consistent with Amonjenu, Asogwa and Iornenge (2016) who found out that crop farmer in Benue state needed improvement in 10 skills items in formulating farm yard manure, 8 skills items in preparing green manure and 21 skills items in composting to enhance soil fertility for sustainable crop production in Benue state. Furthermore, Asogwa, Ifeanyieze and Ekele (2014) found that 9 plants serve as green manure, 12 practices are needed by crop farmers in utilizing green manure as a sole crop and 10 practices as an intercrop for maintaining soil fertility in Enugu State. The implication of the above findings is that Agricultural Education lecturers would require re-training interventions in order to build their capacity for effective delivery of manure preparation and application techniques in their various colleges.

The result of the study on Table 5 shows that Agricultural Education lecturers in North Central Nigeria are of low quality assurance in all the 21 items on crop rotation techniques for effective teaching of students in Colleges of Education. These items were: Determine the goals in view making a long range rotation plan, Divide the field/farm into equal proportions based on the number of crops to be used in the rotation, Ensure each crop in the rotation should be from a different family and species/feeding habits, Decide on the sequence the crops should occur, Decide on how many years or season each cycle of the rotation should run, Make a list of crops to grow in the farm, Group them (crops) together by plant family, Ensure that the area cultivated to each crop is nearly the same year after year, Create an acceptable planting schedule, Draw a plot map of beds, ridges or mounds on a graph paper, Ensure that in the map, the target crop (the main crop) is planted immediately after the legumes or fallow period among others.

The results obtained from analysis of data on the corresponding hypothesis in table 6 reveals that Agricultural Education lecturers in colleges of education in North Central Nigeria significantly possess low quality assurance in crop rotation techniques. The finding of this study is in congruous with Ifeanyieze (2012) who found out that teachers of Agricultural Education need improvement in 11 skill items identified in crop rotation for effective teaching of soil conservation in Colleges of Education in South East Nigeria. The skills according to the author were: make a long rotation plan, make a list of crops to grow, group the crops by plant family, create planting schedule, draw a map of beds, ridges or mounds, indicate where to plant each crop in the map, label each crop with the year and plot, implement the plan and others. Similarly, Olabiyi, Harris, Atungwu, and Rosenfeld (2010) in their assessment of crop rotation and soil fertility building schemes in selected organic farms in England, found crops on rotation that the organic farmers requires capacity building in their utilization to be; potato, cabbage, parsnips, leeks, salads, cauliflower, broccoli, sweet corn, wheat, barley, cucurbits, French beans, beets, chards, carrots, onion, spinach and broad bean. The authors buttressed further that a fairly long range of 6 to 12 years crop rotation scheme in operation is an added advantage in the control of any soil borne disease organism. This imply that in organic agriculture, long term crop rotation and soil fertility building programmes are very essential for the control of soil inhabiting pathogen and also for augmenting soil nutrient (soil fertility building). This might be the reason why Uzoh, Igwe, Okebalama and Babalola (2019), averred that Grain legumes-maize rotations equally increased maize yield over sole maize.

The submission of Ogwo and Oranu (2006) that teachers must be continuous learners through improvement programmes to be effective in performing specified teaching activities is further upheld by findings of this study. The findings of the authors cited above, gave credence to the findings of this study on soil measures where teachers of Agricultural Education need capacity building for effective teaching of students in Colleges of Education.

Conclusion

The position of the teacher is very crucial in implementing curriculum contents in schools. Essentially, the teacher is involved in a process of shaping the behaviour of the learner for adequate adjustment in the larger society. Since she cannot give out what she does not have, the teacher should possess basic technical, pedagogical and managerial competencies for effective instructional delivery. Teachers of Agricultural Education in Colleges of Education in North Central Nigeria were found deficient in imparting requisite skills, knowledge, right attitude and aptitude in soil conservation. This was demonstrated in their graduates who could not effectively demonstrate such abilities while teaching in their various schools. In order to ensure effective teaching of basic soil conservation principles in Primary and Junior Secondary Schools, concerted efforts must be made to improve the performance of the teachers in Colleges of Education. It is in this direction that this study was carried out to determine the quality assurance of Agricultural Education lecturers in soil conservation in Colleges of Education in North Central Nigeria. The determination process revealed that Agricultural Education lecturers possess low quality assurance in all the: 48 measures in soil erosion prevention and 49 techniques in manure preparation and application for effective teaching of students in Colleges of Education in North Central Nigeria. From the findings of this study, it is clear that capacity building of teachers in Nigeria is indispensable if the needed human resources to put Nigeria in the world map for social, scientific, cultural and technological advancement are to be evolved and sustained.

Recommendations

Based on the findings of the study, the following recommendations have been made.

1. As a result of the deficiency observed in the performance level of Agricultural Education lecturers in Colleges of Education, there is need for the administrators of Colleges of Education, Ministry of Education at the Federal levels in conjunction with National Commission for Colleges of Education to monitor the implementation of the curriculum in order to ensure correct and full implementation of Agricultural Education curriculum.
2. The identified practices in soil erosion prevention and control should be utilized in re-training Agricultural Education lecturers in areas of their deficiencies to enhance their performance.
3. Agricultural Education lecturers in Colleges of Education should utilize the findings to seek for sponsorship from their administrators in order to attend retraining programme for their capacity building in soil conservation.
4. The administrators of Colleges of Education should utilize the findings of this study on crop rotation techniques to organize internal workshops in their Colleges for re-training of the lecturers making use of resource persons in crop production from universities in order to enhance their capacity.

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