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## NEED GAP INDEX OF LECTURERS' COMPETENCE IN DETERMINING SOIL PHYSICAL PROPERTIES FOR EFFECTIVE TEACHING OF STUDENTS IN COLLEGES OF EDUCATION

By

***Vincent C. Asogwa & Ibe, Valentine S. O.***

Department of Agricultural/ Home Economics Education,  
Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

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### ABSTRACT

*This study determined need gap index of lecturers' competence in determining soil physical properties for effective teaching of students in Colleges of Education. The study made use of descriptive survey research design. The study was carried out in South-East, Nigeria. The population of this study was 157 who were all involved in the study. A 41-item structured questionnaire titled: Soil Physical Properties Determination Questionnaire (SPPDQ) was subjected to face validation by five experts. Cronbach Alpha reliability method was utilized to determine the internal consistence of the SPPDQ items. The Alpha reliability of 0.96 and 0.93 were obtained for needed and performance categories. Data collected were analyzed using arithmetic mean and Need Gap Index (NGI) to answer the research questions. It was found that the lecturers' competence in determining physical properties of soil, soil structure and soil temperature was low but high in determining soil colour for effective teaching of students in Colleges of Education in South-East, Nigeria. It was recommended among others that lecturers of Agricultural Education should utilize this information to ask for permission from their administrations to enable them attend workshops or short re-training courses to make up for their deficiencies in determining physical properties of soil.*

**Keywords:** Agricultural Education, need gap index, lecturers, physical properties of soil.

### INTRODUCTION

Physical property of soil is one of the components of soil fertility taught to students in the Colleges of Education. Generally, Wikimedia (2011) viewed physical properties of soils as observable features or qualities of soil. Olaitan and Lombin (1985) stated that the physical properties of the soil that directly determines its fertility or productive capacity include texture, structure, colour, temperature and aeration while the degree of aeration, moisture content and root penetration indirectly influence the soil fertility. Tree Fruit Research and Extension Centre (2004) stated that physical properties of soil determines the amount, size and arrangement of pores in the soil, the ability of a

soils microspores to hold water for plant use (Water-Holding Capacity, WHC), the rate at which water moves through the soil (permeability), the amount and rate of nutrient released for plant use, the amount of air present in the soil (soil aeration), the soil temperature and the cultivability of the soil. The Centre posited that there are seven physical, properties of soil which include texture, structure, colour, and temperature, water holding capacity (moisture content), aeration and compactions. International Food Policy Research Institute (2006) recommended that a clear understanding of and practices in soil fertility especially physical properties by farmers, researchers and learners at all levels could increase agricultural

production and food security to safeguard the environment for future generation. It was on this premise, that the researcher deemed it necessary to determine the need gap analysis of lecturers' competence in determining soil physical properties for effective teaching of students in colleges of education.

A College of Education, according to National Policy on Education of the Federal Republic of Nigeria (FRN, 2013) is a tertiary institution that offers three years minimum training to students in many programmes of interest for entry into the teaching profession. That is, it prepares teachers for three years in programmes like integrated science, home economics, business education and agricultural education which is the focus of this study.

Agricultural Education as described by Ukonze and Olaitan (2010) is a programme designed for preparing or equipping learners with knowledge, skills and attitude in teaching and technical areas of agriculture to enable them impart the same to students in schools and colleges. Ifeanyieze (2011) stated that agricultural education involves the acquisition of knowledge, skills and attitudes in agriculture and teaching by would be teachers in recognized universities or other higher institutions. It targets producing teachers and improving the quality of life for all people by helping farmers increase production, conserve resources and provide nutritious foods. Agricultural Education, in this context, is a programme in Colleges of Education designed to produce teachers that are competent in teaching content areas of agriculture to students in Junior Secondary Schools. The objectives of Agricultural Education in Colleges of Education are to:

1. prepare graduates with right attitudes and knowledge/professional competence in vocational agriculture;
2. produce teachers who will be capable of motivating students to acquire interest in and aptitude for agriculture;

3. develop in the student teachers the appropriate communication skills for effective transmission of agricultural information and skills to the students in the context of their environment;
4. equip the student teachers with adequate knowledge and ability to establish and manage a model school farm effectively and
5. provide a sound background to enhance further academic and professional progression of the student teachers.

(National Commission for Colleges of Education (NCCE), Minimum Standards, 2009:16). 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. A lecturer, in this study, refers to an individual who delivers 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 competence of lecturers has 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 to teach agriculture to students in Secondary and Primary Schools. In a study carried by Ibrahim (2004), it was found out that soil science, agricultural engineering and agricultural economics, in order of difficulty, were the areas where teachers find

difficult to teach to students in secondary schools in Kogi State.

In South-East, there are many educational institutions ranging from primary to tertiary with many students from farming families as well as teachers and lecturers. The teachers and lecturers were expected to be competent in delivering instructions to their students on soil science especially physical properties of soil to ensure continuous crop production and food security in the area. But the experience of the researcher has shown that the ability of lecturers in determining physical properties of soil for effective teaching of students in Colleges of Education is questionable. Most lecturers of Agricultural Education programme avoid the practical aspect of physical properties of soil during instruction which involve demonstration of competence to students. However, in a focus group discussions by the researcher with 13 NCE teachers of Agriculture in 4 secondary schools in Nsukka Education Zone of Enugu State, about understanding soil science, demonstrating physical properties of soil and their challenges, the teachers asserted that it was in soil science courses that they recorded their lowest grade in the Colleges of Education. They attributed their failure and poor foundation in soil science courses to lack of clear understanding of the course contents as presented by the lecturers and the lecturers' inability to demonstrate the practical involved for their observation. Meanwhile, Ibrahim (2004) found that NCE teachers of Agriculture in Kogi State find it difficult in teaching soil science aspect of Agriculture curriculum to students in junior secondary school, that they sometimes avoid it completely due to weak foundation from the Colleges of Education. Besides, Onipede (2013), who found out that lecturers of Agricultural Education in Colleges of Education have low competence (47.10%) in teaching soil science courses to students which determination of physical properties of soil is an aspect. Based on the above information about the lecturers teaching soil

science to students in Colleges of Education on their competence which is low, it is established that the lecturers need improvement but the extent to which they need is not yet known which can only be determined through need gap analysis.

Need gap is explained by Rosett and Sheldon (2001) as 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). Berwick 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. Need gap analysis as described by Chuta (1999) is 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. Rosett and Sheldon (2001) 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 determining physical properties of soil. The result obtained is the Need Gap Index or indicator that points out the direction and extent of improvement needs of the lecturers in determining soil physical properties for effective teaching of students in Colleges of Education.

### ***Purpose of the Study***

The purpose of the study was to determine the need gap index of lecturers' competence in determining

soil physical properties for effective teaching of students in Colleges of Education. Specifically, the study sought to find out the need gap index of lecturers' competence in determining:

1. soil texture;
2. soil structure;
3. soil colour; and
4. soil temperature for effective teaching of students in Colleges of Education.

### ***Research Questions***

1. What is the need gap index of lecturers' competence in determining soil texture for effective teaching of students in Colleges of Education?
2. What is the need gap index of lecturers' competence in determining soil structure for effective teaching of students in Colleges of Education?
3. What is the need gap index of lecturers' competence in determining soil colour for effective teaching of students in Colleges of Education?
4. What is the need gap index of lecturers' competence in determining soil temperature for effective teaching of students in Colleges of Education?

### **METHODOLOGY**

The study made use of descriptive survey research design. The design is appropriate for this study since it used questionnaire for collecting data from the respondents for determining capacity building needs of lecturers of Agricultural Education in soil fertility and fertilizer management practices in Colleges of Education. The study was carried out in South-East, Nigeria made up of Abia, Anambra, Ebonyi, Enugu and Imo State. The population of this study was 157 persons made of 53 lecturers of soil science in the universities, 17 lecturers

of Agricultural Education programme in the universities, and 87 lecturers of Agricultural Education in the Colleges of Education, all from South-East. The entire population of the 157 respondents was used in the study because of its manageable size that was effectively handled.

The instrument for data collection was a 41-item structured questionnaire titled: Soil Physical Properties Determination Questionnaire (SPPDQ) developed by the researcher from literature reviewed. The SPPDQ had 45 items that were grouped into two parts; 1 and 2. Part 1 had 4 items which was used to collect information on the personal data of the respondents while part 2 had 4 sections made up of 41 corresponding items which were used to collect information from the respondents on physical properties of soil. Each section had response categories of needed and performance. The needed category had four-point response options Highly Needed (HN), Averagely Needed (AN), Slightly Needed (SN), and Not Needed (NN) with corresponding values of 4, 3, 2, and 1 respectively. The performance category had four-point response options High Performance (VHP), Average Performance (HP), Low Performance (LP), and No Performance (VLP) with corresponding values of 4, 3, 2, and 1 respectively. The needed column of the SPPDQ was responded to by lecturers of Soil Science in universities, lecturers of Agricultural Education in universities and lecturers of Agricultural Education in Colleges of Education involved in the study while the performance column was responded to by the lecturers in Colleges of Education only. The instrument was subjected to face validation by five experts: one from Department of Soil Science, University of Nigeria, Nsukka; one from Department of Soil Science, University of Agriculture, Makurdi; one from Department of Agricultural Education, University of Agriculture, Markudi; one from College of Education, Ikwo and one from College of Education, Bichi. The corrections and suggestions of the experts were used to improve the

SPPDQ for final production. Thirty copies of the SPPDQ were administered on 30 lecturers randomly selected from Universities and Colleges of Education Benue State. Ten copies of the questionnaire were administered to 10 lecturers of soil science in universities, 10 from Agricultural Education in universities and 10 from Agricultural Education in Colleges of Education. The data collected were analyzed using Cronbach Alpha reliability method to determine the internal consistence of the SPPDQ items. The Alpha reliability of 0.96 and 0.93 were obtained for needed and performance categories of the questionnaire respectively.

The researcher employed the assistance of five research assistants (one from each state) to help in the administration of the SPPDQ on the respondents in their respective states. The research assistants were instructed on what to do when distributing and retrieving the copies of the questionnaire from the respondents. A total of 157 copies of the questionnaire were distributed to the respondents by the researcher through five research assistants. The research assistants retrieved 142 copies of the questionnaire from the respondents when they finished checking their response options on items. The researcher went round to collect the retrieved questionnaire from the research assistants at an agreed institution in each of the states.

The tool used for data analysis was Statistical Package for Social Sciences (SPSS), version 16.0. The

data collected from the respondents were analyzed using arithmetic mean and Need Gap Index (NGI) to answer the research questions. The NGI was determined thus.

- a. The arithmetic mean of the needed category ( $X_n$ ) was calculated for each item.
- b. The arithmetic mean of the performance category ( $X_p$ ) was calculated for each item.
- c. The Need Gap Index (NGI) was determined by finding the difference between the two arithmetic means of needed and performance categories for each item. That is,  $NGI = X_n - X_p$  (Adapted from Olaitan and Ndomi, 2000) where:
  1. Need Gap Index (NGI) was positive (+), it indicated low competence and need for improvement because the level at which the lecturers could performed each item was lower than the level at which it was needed.
  2. NGI was negative (-), it indicated high competence and no need for improvement because the level at which the lecturers could performed each time was greater than the level at which it was needed.
  3. NGI was zero (0), it indicated equal competence and no need for improvement because the level at which the lecturers could performed each item was equal to the level at which the item was needed.

## RESULTS

The results of the study are presented in Table 1 to 4.

**Table 1:** Need Gap Analysis of Lecturers' competence in determination of soil texture

| S/N | Determining soil texture (Hydrometric method)  | NGI   |       |             | Remark |
|-----|--|-------|-------|-------------|--------|
|     |  | $X_n$ | $X_p$ | $X_n - X_p$ |        |
| 1   | Collect 1kg of soil sample from the field  | 3.67  | 3.63  | 0.04        | LC     |
| 2   | Dry the soil sample if wet   | 3.66  | 2.33  | 1.33        | LC     |
| 3   | Sieve an air-dried soil sample through 2m or 1.7mm sieve                                   | 3.62  | 2.67  | 0.94        | LC     |
| 4   | Measure out 50g of the soil into 750cm <sup>3</sup> beaker                                 | 3.62  | 2.61  | 1.00        | LC     |
| 5   | Add 50cm <sup>3</sup> of dispersing agent and 200cm <sup>3</sup> of distilled water to the | 3.66  | 2.65  | 1.01        |        |

| S/N | Determining soil texture (Hydrometric method)                         | X <sub>n</sub> | X <sub>p</sub> | NGI                            |  | Remark |
|-----|---|----------------|----------------|--------------------------------|--|--------|
|     |   |                |                | X <sub>n</sub> -X <sub>p</sub> |  |        |
|     | soil sample in the beaker   |                |                |                                |  | LC     |
| 6   | Stir the suspension and leave it for 24hours.                         | 3.60           | 2.55           | 1.05                           |  | LC     |
| 7   | Transfer the mixture from the beaker to the a bottled cup             | 3.62           | 2.62           | 1.00                           |  | LC     |
|     | Fix the cup of the bottled stirrer and stire for 10 minutes until all |                |                |                                |  |        |
| 8   | the aggregates are broken   | 3.62           | 2.55           | 1.07                           |  | LC     |
| 9   | Pour the suspension into a 1dm <sup>3</sup> measuring cyclinder       | 3.58           | 2.57           | 1.00                           |  | LC     |
| 10  | Make the solution up to 1dm <sup>3</sup> with distilled water         | 3.57           | 2.96           | 0.60                           |  | LC     |
| 11  | Cover the top of the cylinder and shake vigorously                    | 3.58           | 2.53           | 1.04                           |  | LC     |
| 12  | Insert a hydrometer into the suspension                               | 3.67           | 2.60           | 1.06                           |  | LC     |
| 13  | Record a reading after four minutes                                   | 3.65           | 2.53           | 1.11                           |  | LC     |
|     | Remove the hydrometer from the suspension and shake the               |                |                |                                |  |        |
| 14  | cylinder vigorously again   | 3.58           | 2.51           | 1.06                           |  | LC     |
| 15  | Replace the hydrometer into the cylinder and record the time          | 3.65           | 2.52           | 1.13                           |  | LC     |
| 16  | Record the hydrometer reading at the end of two hours                 | 3.64           | 2.51           | 1.13                           |  | LC     |
| 17  | Decant the liquid after second reading                                | 3.58           | 2.58           | 0.99                           |  | LC     |
|     | Transfer sand at the bottom of the cylinder to a small beaker and     |                |                |                                |  |        |
| 18  | oven dry it for 24hours at 105 <sup>0</sup> C                         | 3.64           | 2.88           | 0.75                           |  | LC     |
| 19  | Weigh the sand and record the weight                                  | 3.56           | 2.61           | 0.95                           |  | LC     |
| 20  | Sieve the sand through 0.2m-0.002mm diameter sieve                    | 3.61           | 2.58           | 1.02                           |  | LC     |
| 21  | Weigh the coarse sand remaining in the sieve                          | 3.63           | 2.62           | 1.00                           |  | LC     |
| 22  | Calculate the texture of the soil using appropriate formula           | 3.67           | 2.67           | 0.99                           |  | LC     |

X<sub>n</sub> = mean of need, X<sub>p</sub> = mean of performance, LC = Low Competence.

Data in Table 1 shows that the Need Gap Index of lecturers' competence in all the 22 items ranged from 0.04 to 1.13 and were positive. This indicated that the lecturers of Agricultural Education have low competence

in all the 22 items in determining physical properties of soil and need improvement for effective teaching of students in Colleges of Education in South-East, Nigeria.

**Table 2:** Need Gap Analysis of Lecturers' competence in determination of soil structure

| S/N | Determining soil structure  | X <sub>n</sub> | X <sub>p</sub> | NGI                            |  | Remark |
|-----|---|----------------|----------------|--------------------------------|--|--------|
|     |   |                |                | X <sub>n</sub> -X <sub>p</sub> |  |        |
| 1   | Select a site of the farm for determining the soil structure                            | 3.62           | 2.59           | 1.02                           |  | LC     |
| 2   | Dig wide holes of 30cm deep in about four positions on the selected portion of the farm | 3.57           | 2.58           | 0.98                           |  | LC     |
| 3   | Scrape the side of the holes with a spade or trowel                                     | 3.58           | 2.67           | 0.91                           |  | LC     |
| 4   | Observe the arrangement or aggregation of the soil particles                            | 3.67           | 2.64           | 1.03                           |  | LC     |
| 5   | Classify the soil structure based on the standard soil structure                        | 3.66           | 2.74           | 0.92                           |  | LC     |

|   |   |      |      |      |    |
|---|---|------|------|------|----|
|   | chart   |      |      |      |    |
| 6 | Record the type of the soil structure observed. | 3.61 | 2.71 | 0.89 | LC |

$X_n$  = mean of need,  $X_p$  = mean of performance, LC = Low Competence.

Data in Table 2 shows that the Need Gap Index of lecturers' competence in all the 6 items ranged from 0.91 to 1.03 and were positive. This indicated that the lecturers of Agricultural Education have low competence

in all the 6 items in determining soil structure and need improvement for effective teaching of students in Colleges of Education in South-East, Nigeria.

**Table 3:** Need Gap Analysis of Lecturers' competence in determination of soil colour

| S/N | Determining soil colour                                 | $X_n$ | $X_p$ | NGI<br>$X_n - X_p$ | Remark |
|-----|---|-------|-------|--------------------|--------|
| 1   | Select a site on the farm                               | 2.70  | 3.63  | -0.93              | HC     |
| 2   | Dig a hole of 30cm deep in the site                     | 3.57  | 3.73  | -0.16              | HC     |
| 3   | Spread the soil sample on a newspaper to dry it, if wet | 2.74  | 3.60  | -0.86              | HC     |
| 4   | Compare the soil colour with the standard colour chart  | 2.62  | 3.67  | -1.04              | HC     |
| 5   | Observe the colour match on the colour chart            | 2.64  | 3.62  | -0.98              | HC     |
| 6   | Record observation of the soil colour                   | 2.66  | 3.67  | -1.01              | HC     |

$X_n$  = mean of need,  $X_p$  = mean of performance, HC = High Competence.

Data in Table 3 shows that the Need Gap Index of lecturers' competence in all the 6 items ranged from -0.86 to 1.04 and were positive. This indicated that the lecturers of Agricultural Education have high

competence in all the 6 items in determining soil colour and need no improvement for effective teaching of students in Colleges of Education in South-East, Nigeria.

**Table 4:** Need Gap Analysis of Lecturers' competence in determination of soil temperature

| S/N | Measuring soil temperature  | $X_n$ | $X_p$ | NGI<br>$X_n - X_p$ | Remark |
|-----|---|-------|-------|--------------------|--------|
| 1   | Select a location on the farm   | 3.62  | 2.58  | 1.03               | LC     |
| 2   | Dig a small hole of 5cm deep at the 5cm depth   | 3.54  | 2.66  | 0.87               | LC     |
| 3   | Insert bulb or sensing part of the thermometer at the 5cm depth   | 3.65  | 2.60  | 1.05               | LC     |
| 4   | Replace the dug up soil to ensure firm contact with the surrounding soil  | 3.60  | 2.71  | 0.89               | LC     |
| 5   | Shade the thermometer at 2 minutes interval if there is bright sunshine   | 3.65  | 2.76  | 0.88               | LC     |
| 6   | Take reading of the thermometer after 2 minutes for the thermometer and the soil to reach temperature equilibrium | 3.65  | 2.74  | 0.90               | LC     |
| 7   | Record the temperature of the soil  | 3.67  | 2.74  | 0.92               | LC     |

$X_n$  = mean of need,  $X_p$  = mean of performance, LC = Low Competence.

Data in Table 4 shows that the Need Gap Index of lecturers' competence in all the 7 items ranged from 0.87 to 1.05 and were positive. This indicated that the lecturers of Agricultural Education have low competence in all the 7 items in determining soil temperature and need improvement for effective teaching of students in Colleges of Education in South-East, Nigeria.

## **RESULTS**

The result of the study shows that the Need Gap Index of lecturers' competence is low in determining physical properties of soil, soil structure and soil temperature and need improvement for effective teaching of students in Colleges of Education in South-East, Nigeria. The result also revealed that lecturers' competence in determining soil colour was high and need no improvement for effective teaching of students in Colleges of Education in South-East, Nigeria. The findings on determining physical properties of soil, soil structure and soil temperature were in consonance with the findings of Abu (2009) in a study on competency improvement needs of farmers in soil conservation practices in Kogi State, where it was found that farmers needed improvement in the 5 clusters in soil conservation practices. The clusters with their corresponding skill items are tillage (14 skill items), soil testing and analysis (82 skill items), soil erosion prevention and control (194 skill items), manuring (57 skill items), crop rotation (16 skill items) and afforestation (53 skill items). Ifeanyieze (2011) found that teachers of Agricultural Education needed improvement in 6 clusters in soil conservation in Colleges of Education in South-Eastern Nigeria. The clusters in tillage operation (20 skill items), soil testing and analysis (59 skill items), manure preparation and application (62 skill items), crop rotation (13 skill items), soil erosion prevention and control (43 skill items) and irrigation (6 skill items).

The findings were in agreement with the findings of Olaitan, Alawa and Ekong (2009), who found that farmers required capacity building on 10 competencies in soil testing and analysis, 30 in manure and manuring and 31 in fertilizer application for enhancing crop production in Cross River State of Nigeria. Also, the findings of Ifeanyieze (2011) that the instructors required capacity building in 20 skill items in tillage practices, 29 skill items in soil testing and analysis; 13 skill items in irrigation and drainage and 11 skill items in crop rotation were in complete disagreement with the present result on lecturers' competence in determining soil colour for effective teaching of students in Colleges of Education in South-East, Nigeria. Therefore, the findings of the authors cited helped to add validity to the results of this study.

## **CONCLUSION**

The Federal Government of Nigeria appreciates the need to continue to improve soil fertility for enhancing food production through its study in higher institutions. The government, thereby encouraged the inclusion of the study of soil fertility and fertilizer management into the curriculum of agriculture in Colleges of Education, which has one of its aspects as physical properties of soil. The lecturers in Colleges of Education expressed difficulty in teaching of the course to students. To achieve the intention of the government in improving the soil for continuous provision of nutrients to plants, the lecturers of Agriculture in Colleges of Education must be able to equip their students with appropriate knowledge and skills in soil fertility and fertilizer management practices. This study was therefore carried out to establish Need Gap Index (NGI) of lecturers' competence in determining physical properties of soil for effective teaching of students in Colleges of Education in South-East, Nigeria. This study revealed that the Need Gap Index of lecturers' competence is low in determining



physical properties of soil, soil structure and soil temperature and need improvement for effective teaching of students in Colleges of Education in South-East, Nigeria.

## RECOMMENDATIONS

Based on the findings of the study, it was recommended that the:

1. Lecturers of Agricultural Education should utilize this information to ask for permission from their administrations to enable them attend workshops or short re-training courses to make up for their deficiencies in determining physical properties of soil.
2. Lecturers of Agricultural Education should use the information to seek for sponsorships for their administrations on staff development programme.
3. Administrators of Colleges of Education should utilize the information to approve leave for the lecturers of Agricultural Education so that they can build their capacity through in-service training in areas of their deficiency.
4. Administrators should utilize the information on the low competence of lecturers in determining physical properties of soil to approve sponsorship for re-training of their lecturers in relevant areas at co-operating institution.

## REFERENCES

- Abu, M. (2009). *Competency improvement needs of farmers in soil conservation in Kogi State*. Unpublished thesis, Department of Vocational Teacher Education, University of Nigeria, Nsukka.
- Bakare, J.A. & Owodunni, A.S. (2011). Performance Improvement needs of Lecturers in the Application of Computer to the Teaching of Electrical/Electronics in Colleges of Education in South Western States, Nigeria. *Journal of Nigerian Educational Research Association*, 16(1), 131-138.
- Chuta, C.Z. (1995). Comparative assessment of the training needs of senior agricultural extension. *Unpublished thesis, Department of Agricultural extension, University of Nigeria, Nsukka*.
- Federal Republic of Nigeria (2013). *National Policy on Education* (4<sup>th</sup> ed). Lagos: NERDC Press.
- Ibrahim, H. H. (2004). Areas of Agriculture that are difficult to teach to students by Teachers in Secondary Schools in Kogi State. Unpublished M.Ed thesis. Department of Vocational Teacher Education, University of Nigeria, Nsukka.
- Ifeanyiyeze, F.O. (2012). Professional and Technical Skill Improvement needs of teachers of agricultural education programme in soil testing and analysis for effective teaching of students in Colleges of Education in South-Eastern Nigeria. *Journal of Institute of Faculty of Education, University of Nigeria, Nsukka*.
- International Food Policy Research Institute (2006). *Achieving Balance conservation and up take of Nutrients*. Washington D.C. [www.inpri.org](http://www.inpri.org) Retrieved 15/08/11
- National Commission for Colleges of Education (NCCE, 2009). Minimum standard for Nigeria Certificate in Education: Vocational Technical Education (3<sup>rd</sup> ed). Abuja NCCE.
- Nwigwe, M.N. (2009). *Need gap Analysis*. Retrieved from <http://www.needgaanalysis.org/edu/wiki.on27/03/11>
- Olaitan, S.O, Alawa, D.A & Ekong, A.O (2009) Capacity building needs of farmers in improving soil nutrients for enhancing crop production in Cross River State, Nigeria. *Nigerian Vocational Journal*, 14(1), 107-116

- Olaitan, S.O. and Lombin G (1985). *Introduction to Tropical Soil Science*. Hongkong: Macmillan Publishing Ltd.
- Olaitan, S.O. & Ndomi, B. M. (2000). *Vocametrics*. Onitsha- Nigeria: Cape Publisher International Limited.
- Onipede, I. (2013). Effectiveness of resource inputs into the implementation of agricultural education programme in Colleges of Education in south-west, Nigeria. Unpublished PhD thesis. Department of Vocational Teacher Education, University of Nigeria, Nsukka.
- Rosett, A. and Sheldon, K. (2001). *Analysis: The study we do in order to figure out what to do*. San Francisco Need Analysis Htm.
- Tree Fruit Research & Extension Center (2004). *Tree fruit entomology*, Washington State University.
- Ukonze, J.A. & Olaitan, S. O. (2010). Quality assurance of teachers of agricultural education programme in Nigerian Universities. *Nigerian Vocational Association Journal/(NVA)*. Vol 14(2): 128-138
- Wikipedia (2011). The Free Encyclopaedia. [http://en.wikipedia.org/wiki/e-textural\\_classes\\_of\\_soil](http://en.wikipedia.org/wiki/e-textural_classes_of_soil)