

Skills Improvement Required by Lecturers in using some Agro-Climatological Instruments for Effective Teaching-Learning of Agriculture in Colleges of Education in Adamawa and Taraba States, Nigeria

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Abstract

The purpose of the study was to determine the skills improvement required by lecturers in using some agro-climatological instruments for effective teaching-learning of agriculture in Colleges of Education in Adamawa and Taraba States, Nigeria. A survey research design was used for the study. Four research questions guided the study. The study was carried out in Adamawa and Taraba States, Nigeria. The population of the study was 109 respondents comprising of 12 Lecturers of Agricultural Education, 7 Lecturers of Soil Science, 5 Lecturers of Geography in Universities and 85 Lecturers of Agricultural Education in Colleges of Education. The entire population constituted the sample for the study. The instrument for data collection was a structured questionnaire named "Using Agro-climatological Instruments Questionnaire" (UAIQ). Three experts validated the instrument and was trial-tested. A Cronbach Alpha reliability coefficient of 0.83 was established indicating that the instrument was reliable to elicit information for the work. One hundred and nine copies of the questionnaire were administered to the respondents by two trained research assistants in the two states in Nigeria. The entire questionnaire was retrieved. The data collected were analyzed using weighted mean and improvement required index (IRI) to answer the 4 research questions. It was found that all the 47 skills improvement required identified in the use of some Agro-climatological instruments were required by Lecturers of Agricultural Education in Colleges of Education. The result revealed that Lecturers of Agricultural Education require skills improvement on the following items: 8 skills on using Wind Vane, 10 skills on using Anemometer, 19 skills on using Rain Gauge and 10 skills on using Evaporation meter. Based on these findings, it was recommended that: Lecturers of Agricultural Education should seek for ways of improving their skills in using these Agro-climatological instruments; The identified skills improvement required by lecturers of Agricultural Education should be made available to National Commission for Colleges of Education who will use the information to recommend to TET-Fund to grant the lecturers allowances or sponsorship to enable them attend skills improvement programmes nationally or internationally; Skill acquisition organizations should package the finding of the study into capacity building programmes for re-training both Lecturers of Agricultural Education in Colleges of Education and teachers of Agriculture Science in Secondary Schools in Adamawa and Taraba States, Nigeria.

Keywords:

Skills improvement,
Agro-climatological
Instruments and
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Background to the Study

Agricultural Education programme is a course of study in Universities and Colleges of Education. On the other hand, Osinem (2007) perceived Agricultural Education as a process of imparting knowledge, skills and attitudes in agriculture to the learner at any level. In the view of Ukonze and Olaitan (2010), Agricultural Education is described as a programme designed for preparing or equipping learners with knowledge, skills and attitude in teaching and technical areas of agriculture to enable them impart same to students in Schools and Colleges. In the opinion of Akpomedaye (2011), Agricultural Education is an occupational education design to develop a particular knowledge and skills associated with various farming designs. In this study, Agricultural Education is a programme in Colleges of Education and other tertiary institutions designed with series of activities for equipping students with knowledge, skills and attitude in pedagogy in agriculture required for effective teaching of content areas in agriculture to students in primary and secondary schools after graduation.

Agricultural Education as a course of study is offered in tertiary institutions. Tewarie (2014) asserts that tertiary institutions are those institutions that are involved in teaching and learning processes that occurs following the completion of Secondary School Education and provide academic credits and competencies that lead to certificates, diplomas and degrees from Universities, Polytechnics, Colleges and similar institutions. Odionye (2014) maintained that tertiary institutions are those higher institutions that provide education after Secondary Education in Universities, Polytechnics, Colleges of Education, Monotechnics, including institutions offering corresponding courses. A College of Education is a tertiary institution that offers three years minimum training to students in programmes of interest such as Agricultural Education for entry into teaching profession (Federal Republic of Nigeria (FRN), 2004). The objectives of Agricultural Education programme in College 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 students (National Commission for Colleges of Education (NCCE), minimum standard, 2012).

In order to achieve the above objectives, the National Commission for Colleges of Education in its Minimum Academic Standard clearly listed courses to be offered by students in Agricultural Education to cover: Introduction to agriculture, Poultry production, Fish production, Principles of farm management, Youth organization in agriculture, Horticulture, Land survey and farmstead planning, Agro-climatology,

among others (NCCE, 2012). This study is focused on skill improvement required on some Agro-climatological instruments in agro-climatology aspect of the programme.

The study of climates as applied to the effect on the productivity of plants and animals of agricultural importance is called agro-climatology. Climate Prediction Centre, US report (2006), explained that agro-climatology is the study of climate in relation to its effects on water, soil, crop and livestock. Chang (2013) viewed agro-climatology as the study of climate in relation to the productivity of plants and animals of agricultural importance. The author reiterated that the main aim of agro-climatology is to obtain necessary information about climate and apply them for the purpose of improving farming practices and increasing agricultural productivity in quantity and quality. In Agricultural Education programme of Colleges of Education, the objectives of agro-climatology as contained in the curriculum of NCCE, minimum standard (2012) are to:

- a. prepare graduates with basic knowledge in scope and general principles of agro-climatology;
- b. develop in student-teachers the appropriate skills in operating equipment used in agro-climatology;
- c. produce teachers who will be capable of explaining and predicting the effects of climatic elements on crops, livestock and soil in the ecological zones of Nigeria, and
- d. equip the student-teachers with adequate knowledge and ability to forecast weather for agricultural benefits.

The objectives of agro-climatology are contained in the content which includes the meaning and scope of agro-climatology and equipment used in the study, ecological zones of Nigeria and their effects on distribution of crops, livestock and soil formation and principles underlining weather forecasting (NCCE, 2012). The objectives of agro-climatology are achieved with effective use of Agro-climatological instruments that serve as instructional materials to teach students of agriculture in Colleges of Education.

Instrument is a device for measuring or displaying something. In the view of Ahrens (2009), instrument is a tool or device used for a particular task, especially for delicate or scientific work. In this study, instruments are those tools and devices used by lecturers of agricultural education as instructional materials to teach agro-climatology to students. Some Agro-climatological instruments required for the study of agro-climatology include: Rain gauge, Measuring glasses, Wind vane, Anemometer and Sunshine Recorder (NCCE, 2012). These Agro-climatological instruments are recommended to be used by lecturers for instructional delivery of the content of agro-climatology in agricultural education programme in Colleges of Education.

The National Policy on Education (FRN, 2004), stated that a lecturer is a person who had undergone approved professional training in education at appropriate levels and is capable of imparting knowledge, skills and attitudes to the learners in a relevant programme. A lecturer of Geography is someone who has undertaken a teacher training programme in the University with the mandate of teaching Geography to students (Okunrotifa, 1999). A lecturer of Soil Science is an individual who delivers instruction to

students in Soil Science in the Universities. On the other hand, a lecturer of Agricultural Education, as explained by Isiwu and Okonkwo (2013), is a person who had undergone a teacher preparatory programme in the University and saddled with the responsibility of imparting knowledge, skills and attitudes in agriculture to students. Lecturers in this study are individuals who had undergone training in pedagogical and technical aspects of Agricultural Education programme in a University and have the onus of teaching agro-climatology to students of agriculture in Colleges of Education and other tertiary institutions. The lecturers of Agricultural Education teach courses in agricultural education including agro-climatology and evaluate them for competence before they are allowed to graduate. The lecturers use the recommended Agro-climatological instruments by the NCCE in the Minimum Standard for teaching of agro-climatology to students.

A student as described by Miriam (2012) is someone who is admitted into an institution such as College or University. Collins (2013) viewed a student as a learner or scholar who attends a school to seek knowledge from professional teacher or books. Students are learners who were admitted into College of Education to study Agricultural Education programme (Asogwa, Isiwu and Jumbo, 2014). Students in this study refer to individuals who are enrolled in the Department of Agricultural Education in a College of Education and other tertiary institutions, which are either owned by the Federal Government, State Government or private organization(s) and offers agro-climatology. These students are taught agro-climatology by lecturers using Agro-climatological instruments.

Using is the art of utilizing something especially for practical purpose (Olagunju and Abioma, 2008). The authors emphasized that using is the process of managing and organizing resources in teaching which brings about fruitful learning since it stimulates students sense as well as motivating them. In the view of Asogwa, Onu and Egbo (2013), using is how often an instructional material in fish production is utilized by teachers of agriculture in secondary schools. In this study, using is the ability of the lecturers of Agricultural Education to operate Agro-climatological instruments for teaching students in Colleges of Education and other tertiary institutions. The lecturers use the Agro-climatological instruments to equip the students with knowledge and skills required for operating them for agricultural production in their environment.

Usually the term skill is used to refer to a level of performance in the sense of accuracy and speed in performing particular tasks (Winterton, Delamane- Le Deist and String fellow, 2006). In the submission of Daramola (2008), skill is a well established habit of doing things which involves the acquisition of performance capability. The author maintained that to possess skill is to demonstrate the habit of thinking, acting and behaving in a specific activity in such a way that the process becomes normal to the individuals through practice and repetition. In the view of Aji and Ari (2010), skill is the ability to do something expertly and well. They reiterated that skill is an organized sequence of action, proficiency, executed and usually displaying a flexible but systematic temporal patterning. Akpomedaye (2011) maintained that skill is a well established habit of doing something involving the acquisition of performance capability. Adeyemi (2012)

established that skill is the ability to perform a task. Asogwa, Olaitan and Asouzu (2013) explained skills as well established habit of doing things by people. In this study, skill refers to the specific abilities possessed by lecturers in using Agro-climatological instruments for teaching students in Colleges of Education and other tertiary institutions. It is the expectation of Government that the students should acquire skills in operating the Agro-climatological instruments from their lecturers before graduation. This will enable the students to effectively teach the use of such Agro-climatological instruments to students in Junior Secondary Schools during teaching practice and after graduation to enhance agricultural production. Perhaps, since some of the Lecturers in Colleges of Education could have same challenges in the skills for operating Agro-climatology facilities, and have the need for skill improvement.

Nonetheless, improvement is the act of making something better. Improvement in the view of Eze and Adeyemi (2012) is the act of making the skills possessed by women farmers in the area better for successful performance of specific tasks involved in bitter leaf production. On the other hand NHS Institute for Innovation and Improvement (2013) reported that improvement is continually working together to enhance the experience and outcomes for patients and users and looking for the other ways to provide health and social care that continually enhance the way it meets the needs of those who depend on it and the working lives of staff who provide it. Improvement in the context of this study is the continual act of making the skills possessed by lecturers of Agricultural Education better for using Agro-climatological instruments for teaching students of agriculture. To improve the skills of the lecturers on the use of Agro-climatological instruments, it is necessary to first of all determine the level of skills possessed by the lecturers and what they require more for instructional delivery through need assessment. Need assessment, as defined by Migrant Education (2001), is a systematic set of procedures that are used to determine needs, examine their nature and causes, and set priorities for future action. The office added that need assessment focuses on the ends (outcomes) to be obtained, rather than the means (process). In the opinion of Ville de Goyet and Morinière (2006) need assessment is the evaluation of an affected population's situation, aiming to inform decisions about whether and how to provide relief assistance. McCawley (2009), viewed need assessment as a systematic approach to study the state of knowledge, ability, interest or attitude of a defined audience or group involving a particular subject. The author revealed that need assessment provides a method to learn what has already been done and what gaps in learning remains. Also that need assessment is conducted to verify the audience's level of knowledge and skills, its interest and opinions or its learning habits and preferences. Collecting and analyzing needs assessment data allows the investigator to describe the "gap" between what exists and what is required thus finding ways of filling the gap. In this study, need assessment is systematic procedures for determining what gap exist in skills possessed by lecturers in using Agro-climatological instruments, what they need to possess more for effective teaching to students of agriculture in Colleges of Education. The difference between what they possess and what they require to possess in using Agro-climatological instruments will represent the need gap.

Need gap, as explained by Migrant Education (2001) is a discrepancy or gap between “what is” and “what should be”. Rosett and Sheldon (2001) described need gap as the difference between the perceived need and actual need. The authors stressed that need gap can be obtained by subtracting the perceived need level from the actual need level. Need (skill) gap as reported by United Kingdom (UK) Commission for Employment and Skills (2013), are instance in which individuals lack skills in a particular area, preventing them from performing their job effectively. This is the difference that exists between the perceived need and the felt need. In this study, need gap is the discrepancy between the level of capabilities of lecturers and their required capabilities in using Agro-climatological instruments. In order to determine the level of capabilities of the lecturers in using Agro-climatological instruments as well as ascertain what they require to know more in order to be effective in using Agro-climatological instruments for instructional delivery to students in Colleges of Education requires need gap analysis.

Need gap analysis, as presented by Rosett and Sheldon (2001) is the tool that is used by an individual, a group or a company to compare its present performance with its potential performance. Need gap analysis is comparing the best practices identified with the processes currently in place in an organization's practices and the identified best practices for improvement, McGrath (2006) observed. Herder and Olmedilla (2010) reported that need gap analysis is a tool that is used to identify gap between the current situation and the future state to reach along with the tasks required to complete to close the gaps. UK Commission for Employment and Skills (2013) explained that need (skill) gap analysis is a systematic review of the skills held by individuals in a company which involves identifying all the skills required by individuals to carry out their job role effectively followed by the employers identifying the critical and non critical skills required to achieve a higher standard of work by comparing the list of required skills with the actual skills possessed by the individual employee. With reference to this study, need gap analysis is the computation of the mean values of the actual performance of lecturers subtracted from the computation of the mean values of their required performance in using Agro-climatological instruments. The result obtained gives the need (required) gap value which indicates the skill improvement requirement of the lecturers in using Agro-climatological instruments in Colleges of Education in Adamawa and Taraba States, Nigeria.

Statement of the Problem

The occupation of the population of people in Adamawa and Taraba States, Nigeria is farming. The farming activities are influenced by the climatic conditions of the states, where the average rainfall is under 1000mm and temperature over 23°C (Aregheore, 2010). The climatic factors change with the passage of years, which is a global phenomenon. Adakayi (2012) reported in his study that there was lower temperature and rainfall between 1970s and 1980s and higher temperature and rainfall between 1990s and 2000s. Ladan (2014) indicated that daily rainfall records of 30 years in Northern Nigeria revealed the impact of global climate change in form of increasing number of dry spells during the rainy season leading to drought and desertification. These fluctuations of the climatic factors affect agricultural activities of the populace in Adamawa and Taraba

States as they depend on the natural phenomena. The Federal Government of Nigeria saw the need to improve the agricultural activities of Nigerians to enhance food production, and have introduced the study of Agricultural Education as a course of study in Universities and Colleges. The Colleges of Education by directives of the National Commission for Colleges of Education minimum standard employ qualified lecturers to teach Agricultural Education to students. The lecturers teach Agro-climatological instruments in agro-climatology to students, which they are evaluated for competence and mastery for the award of Nigeria Certificate in Education (NCE).

The researcher observed that the Teachers of Agricultural Science in Secondary Schools could not use some available agro-climatological instruments, which made the researcher to engage in discussions with them in secondary schools during teaching practice supervision. It was discovered that they found it difficult to teach and even use these facilities. The teachers indicated that they had problems of preparation by their lecturers in Colleges of Education as they concentrated mostly on the theoretical aspect of these instruments. Indeed, this is in consonant with the finding of Atsumbe (2012) who revealed that students were loaded with the theoretical knowledge aspect of the programme of study than the practical aspect by the lecturers in tertiary institutions. The Nigeria Certificate in Education (NCE) teachers of agriculture in Secondary Schools associated their difficulties in demonstrating with these instruments to their preparation procedures.

The Lecturers of Agricultural Education in Colleges of Education and other tertiary institutions are generally prepared in technical and pedagogical areas of agriculture from Nigerian Universities and are obliged to work in any College of Education in Nigeria where opportunities exist (Isiwu & Okonkwo, 2013). However, from the observations and discussion of the researcher with the teachers of agriculture in some secondary schools during teaching practice supervision, it reveals that lecturers of Agricultural Education in Adamawa and Taraba States, Nigeria like any other College of Education in Nigeria require skills improvement in using these instruments for teaching-learning, therefore the necessity for this research.

Objective of the Study

The purpose of the study was to determine the skills required by lecturers in using some Agro-climatological instruments for effective teaching-learning in Colleges of Education in Adamawa and Taraba States, Nigeria. Specifically, the study focused on the determination of:

- i. Skills improvement required by Lecturers in using Wind Vane for effective teaching-learning in Colleges of Education;
- ii. Skills improvement required by Lecturers in using Anemometer for effective teaching-learning in Colleges of Education;
- iii. Skills improvement required by Lecturers in using Rain Gauge for effective teaching-learning in Colleges of Education; and
- iv. Skills improvement required by Lecturers in using Evaporation meter for effective teaching-learning in Colleges of Education;

Research Questions

Four research questions guided the study:

1. What are the skills improvements required by Lecturers in using Wind Vane for effective teaching-learning in Colleges of Education?
2. What are the skills improvements required by Lecturers in using Anemometer for effective teaching-learning in Colleges of Education?
3. What are the skills improvements required by Lecturers in using Rain Gauge for effective teaching-learning in Colleges of Education? and
4. What are the skills improvements required by Lecturers in using Evaporation meter for effective teaching-learning in Colleges of Education?

Methodology

The study adopted the survey research design. This is a design in which group of people or items is studied by collecting and analyzing data from people or items considered to be representative of the entire group. (Nworgu, 2006). The area of the study was Adamawa and Taraba states, Nigeria. The population of the study was 109 made up of 12 Lecturers of Agricultural Education in Universities, 5 Lecturers of Geography in Universities and 7 Lecturers of Soil Science in Universities and 85 Lecturers of Agricultural Education in the Colleges of Education in Adamawa and Taraba States, Nigeria. The sample for the study was 109 which was the entire population of the respondents.

The instrument for data collection was a structured questionnaire named "Using Agro-climatological Instruments Questionnaire" (UAIQ). The questionnaire was divided into parts, 1 and 2. Part 1 sought information on the personal data of the respondents while part 2 sought information from the respondents on using Agro-climatological instruments. Part 2 was organized based on the some Agro-climatological instruments forming the sections. Section A dealt with Wind Vane (8 items), section B on Anemometer (10 items), section C on Rain Gauge (19 items) and section D on Evaporation meter (10 items). Each section had response categories of required and performance. The required category is made up of a 4-point response options of highly required (HR), averagely required (AR), slightly required (SR) and not required (NR) while the performance category is also made up of a 4-point response options of high performance (HP), average performance (AP), low performance (LP) and no performance (NP) with corresponding values of 4, 3, 2 and 1 respectively.

The instrument was face and content validated by 3 experts. These experts were required to read the questionnaire items thoroughly and correct wrong spellings, wrong information and unclear or ambiguous statements on the questionnaire items. They were requested to remove any information that was not necessary and or add any missing information that was needed. The corrections and suggestions by the experts were used to develop the final copy of the instrument for data collection. A Cronbach Alpha value of 0.83 was determined which was high enough indicating that the instrument (UAIQ) was reliable to elicit data for the work. The trial testing was conducted in Benue State, Nigeria in order to avoid any study bias. The researcher employed the services of two research assistants (one from each State) to help in the administration of the UAIQ on the

respondents in their respective States. The research assistants were trained on how to administer and retrieve the instruments from the respondents.

A total of 109 copies of the questionnaire were distributed to the respondents by the two research assistants who in turn retrieved all the questionnaire after having checked the responses on each questionnaire item. The data collected from the respondents were analyzed using weighted mean and Improvement Required Index (IRI) to answer the research questions 1 to 4. The decision on the required category was based on the real limits of numbers as follows:

- Highly Required = 3.50 - 4.00
- Averagely Required = 2.50 - 3.49
- Slightly Required = 1.50 - 2.49
- Not Required = 1.00 - 1.49

Questionnaire items with a mean value of 3.50 to 4.00 was considered as highly required, 2.50 to 3.49 was considered as averagely required, 1.50 to 2.49 was regarded as slightly required while any item with a mean value below 1.50 was regarded as not required. The general decision was that any item with a weighted mean of 1.50 and above was considered as required while any item with weighted mean less than 1.50 was considered as not required. Standard deviation was used to describe the closeness or dispersion of the opinion of the respondents from the mean and from one another.

The Improvement Required Index (IRI) was used to determine the require gap value of lecturers of Agricultural Education by Eze and Adeyemi, (2012) and Eze and Asogwa, (2013) as follows:

- a. The weighted mean X_r of the required response option for each item will be calculated.
- b. The weighted mean X_p of the performance response option for each item will be calculated.
- c. The require gap (RG) will be determined by calculating the differences between the values of X_r and X_p for each item. That is, $RG = X_r - X_p$.

Where RG is zero (0), it means improvement was not required because the level at which the lecturers of Agricultural Education could perform that item was equal to the level at which it was required. Where RG was positive (+) it means skill was required because the level at which lectures of Agricultural Education could perform that item was lower than the level at which it was required. Where RG was negative (-) it means skill was not required because the level at which lecturers of Agricultural Education could perform that item was greater than the level at which it was required.

Results

Results of the study were presented in the tables below

Table 1: Required-performance gap analysis on Skills Improvement Required by Lecturers in Using Wind Vane for effective teaching-learning in Colleges of Education (n = 109)

S/ N	Item statement	Xr	Xp	Xr-Xp RPG	Remark
1.	Identify the instrument used to measure wind direction	3.61	2.54	1.07	SIR
2.	Source wind vane from the market	3.65	2.55	1.10	SIR
3.	Install the wind vane 10m (33ft) high to minimize the effect of nearby trees and buildings	3.65	2.59	1.06	SIR
4.	Read wind direction using the weather cock	3.67	2.59	1.08	SIR
5.	Mark the North, South, East and West poles on the wind vane	3.71	2.58	1.13	SIR
6.	Read wind direction from which the wind is blowing	3.67	2.56	1.11	SIR
7.	Read wind direction from the arrow of the vane which points to where the wind is blowing from	3.67	2.56	1.11	SIR
8.	Read wind direction from which the tail of the cock points to	3.66	2.51	1.14	SIR

Xr = Mean required, Xp = Mean of performance, RPG= Required-Performance Gap, SIR = Skills Improvement Required.

Data in Table 1 revealed that the Required-Performance Gap Value of the eight (8) skills ranged from 1.06 to 1.14 and were positive. This indicated that lecturers of Agricultural Education require skills on Improvement all the 8 skills in using Wind Vane for teaching-learning in Colleges of Education in Adamawa and Taraba State.

Table 2: Required-performance gap analysis on Skills Improvement Required by Lecturers in Using Anemometer for effective teaching-learning in Colleges of Education (n = 109)

S/N	Item statement	Xr	Xp	Xr-Xp RPG	Remark
1.	Identify the instrument used to measure wind speed	3.71	2.56	1.15	SIR
2.	Identify the number of cups mounted on the vertical mast	3.65	2.56	1.09	SIR
3.	Source anemometer from the market	3.67	2.62	1.06	SIR
4.	Install the conical cups symmetrically about vertical axis	3.64	2.62	1.02	SIR
5.	Install the anemometer 10m (33ft) high to minimize the effect of nearby trees and buildings	3.58	2.62	0.97	SIR
6.	Identify strong wind from how fast the propeller or cups turns	3.59	2.63	0.96	SIR
7.	Identify the strength of the wind using wind sock	3.58	2.73	0.85	SIR
8.	Calculate the wind speed as the cups rotate proportionately to the wind speed	3.61	2.68	0.93	SIR
9.	Read the speed of the wind from counter attached to the anemometer	3.56	2.68	0.88	SIR
10.	Read the speed of wind from a self-recording anemometer called anemograph	3.56	2.71	0.85	SIR

Xr = Mean required, Xp = Mean of performance, RPG= Required-Performance Gap, SIR = Skills Improvement Required.

Data in Table 2 revealed that the Required-Performance Gap Value of the ten (10) skills ranged from 0.85 to 1.15 and were positive. This indicated that lecturers of Agricultural Education require skills Improvement on all the 10 items in using Anemometer for teaching-learning in Colleges of Education in Adamawa and Taraba States.

Table 3: Required-performance gap analysis on Skills Improvement Required by Lecturers in Using Rain Gauge for effective teaching-learning in Colleges of Education (n = 109)

S/N	Item statement	Xr	Xp	Xr-Xp RPG	Remark
1.	Identify the instrument used to measure rainfall	3.62	2.63	0.99	SIR
2.	Source rain gauge and collecting funnel from the market	3.66	2.62	1.04	SIR
3.	Identify the graduated cylinder	3.67	2.60	1.07	SIR
4.	Keep gauge away from obstacles such as trees and buildings to avoid obstruction of rain gauge	3.63	2.65	0.98	SIR
5.	Ensure no obstacle to the funnel keep funnel free from obstacle such as leaves, grass or dirt to allow collection of rain fall	3.57	2.62	0.96	SIR
6.	Keep top of rim of the gauge leveled for uniform collection of rain	3.59	2.71	0.88	SIR
7.	Keep rain gauge graduate clean for the water level to be seen clearly	3.67	2.71	0.97	SIR
8.	Clean the gauge graduate with mild soap and water, bottle mop or sponge for clear reading	3.67	2.72	0.95	SIR
9.	Keep grass not longer than 5cm for a distance of 2m around the gauge	3.62	2.68	0.94	SIR
10.	Install gauge at 30cm above ground level to prevent water splash from entering	3.64	2.62	1.02	SIR
11.	Fasten the gauge to the ground to avoid splashing	3.57	2.59	0.98	SIR
12.	Pour rain drops into the measuring cylinder for measurement	3.64	2.54	1.10	SIR
13.	Take reading at eye level to avoid error due to parallax	3.61	2.56	1.04	SIR
14.	Read to the accuracy of up to 0.1cm	3.67	2.58	1.09	SIR
15.	Read each rainfall in a day	3.63	2.62	1.0	SIR
16.	Read each rainfall immediately to avoid evaporation	3.68	2.55	1.13	SIR
17.	Empty the gauge after each reading	3.62	2.56	1.06	SIR
18.	Plot the rain gauge reading in a graph or in a table	3.55	2.58	0.97	SIR
19.	Interpret the reading for agricultural benefit	3.65	2.59	1.06	SIR

Xr = Mean required, Xp = Mean of performance, RPG= Required-Performance Gap, SIR = Skills Improvement Required.

Data in Table 3 revealed that the Required-Performance Gap Value of the nineteen (19) skills ranged from 0.88 to 1.13 and were positive. This indicated that lecturers of Agricultural Education require skills improvement on all the 19 items in using rain gauge for teaching-learning in Colleges of Education in Adamawa and Taraba State.

Table 4: Required-performance gap analysis on Skills Improvement Required by Lecturers in Using Evaporation meter for effective teaching-learning in Colleges of Education (n = 109)

S/N	Item statement	Xr	Xp	Xr-Xp RPG	Remark
1.	Identify the instrument used to measure evaporation - water loss	3.48	2.54	0.94	SIR
2.	Source evaporation meter	3.45	2.54	0.92	SIR
3.	Demonstrate the installation of the instrument on a level wooden pellet or platform	3.45	2.54	0.96	SIR
4.	Install the instrument 5cm above the ground level to allow air circulate under the pan and to keep the bottom of the pan above the level of water on the ground in rainy weather	3.59	2.58	1.02	SIR
5.	Cite the instrument in an open field free from obstructions such as trees and buildings	3.55	2.55	1.00	SIR
6.	Cite the instrument in full sunlight	3.52	2.55	0.97	SIR
7.	Secure the pan with a chain link to the fence	3.50	2.55	0.95	SIR
8.	Fence the pan 1.5m high to protect it and prevent animals from interfering	3.53	2.55	0.98	SIR
9.	Determine the diameter of the instrument	3.56	2.56	1.00	SIR
10.	Determine the depth of the instrument	3.50	2.56	0.93	SIR

Xr = Mean required, Xp = Mean of performance, RPG= Required-Performance Gap, SIR = Skills Improvement Required.

Data in Table 4 revealed that the Required-Performance Gap Value of the ten (10) skills ranged from 0.92 to 1.02 and were positive. This indicated that lecturers of Agricultural Education require skills improvement on all the 10 items in using Evaporation meter for

teaching-learning in Colleges of Education in Adamawa and Taraba States.

Discussion of Results

In Table 1, it was found from the study that lecturers of Agricultural Education in Colleges of Education require improvement on 8 skills in using Wind Vane for teaching-learning. The skills where the lecturers require improvement include; identify the instrument used for measuring wind direction, source wind vane from the market, install the wind vane 10m high to minimize the effect of nearby trees and buildings, read wind direction from the wind vane among others. This finding is in agreement with the studies of Eze and Adeyemi (2012) on work skill improvement needs of women farmers in bitter leaf production for sustainable income in Abakaliki, Nigeria who indicated that women farmers needed skill improvement in 10 skills nursery preparation, 13 skills in pre-planting and planting and 16 skills in post planting and post harvesting operations. The skills include; transplant the bitter leaf seedlings, irrigate the seedling farm daily for four weeks after transplanting, weed garden regularly and apply poultry manure at the rate of 15 tones/ha among others. The result of the study is also in consonance with the study of Eze and Asogwa (2013) on technical skill capacity building needs of lecturers of agricultural education in organic farming for effective delivery to students in Universities in South Eastern Nigeria who found out in their study that lecturers of agricultural education need skill improvement in 13 skills in crop rotation, 10 skills in green manuring, 21 skills in composting and 8 skills in biological pest and weed control. Such skills include; select appropriate cite that is not water logged, map out square plots 1m x 1m x 3m and label the plots A, B, C, 1, 2, 3 and 4, source compost manure such as plant and animal residue, spray the solution on crop appropriately among others.

The result on Table 2 showed lecturers of Agricultural Education in Colleges of Education require improvement on 10 skills in using Anemometer for instructional delivery to students. The skills include; identify and source the instrument used for recording wind speed, identify the number of cups mounted on the vertical mast, source anemometer from the market, install the conical cups summetically about vertical axis, install the instrument 10m high to minimize the effect of obstacles among others. This study is in consonance with the study of Ibezim, Ohanu and Shodeinde (2014) on skill capacity building needs of electronic technology lecturers for integration of mobile phone hardware repair into the electronic curriculum. They found out that electronic technology lecturers need improvement on 17 skills on phone components identification, 14 skills on repair tools identification, 10 skills on disassembly and assembly of mobile phones, 16 skills on identification of mobile phone hardware fault and 16 skills on remedying of hardware faults. The skills include; remove the battery cover, remove the battery, remove the SIM card, remove the Memory card and unplug the screen and other parts attached to the circuit board by ribbon flex among others. The study is also in agreement with the study of Kadzera (2006) on use of instructional technologies in teacher training Colleges in Malawi. The study found out that teachers need improvement in 8 skills in instructional technologies in the three teacher Colleges. The skills include; operate overhead project, prepare flip charts, demonstrate with flip charts, make instructional material from local resources and use computers to do class work.

The result on Table 3 showed lecturers of Agricultural Education in Colleges of Education require improvement on 19 skills in using Rain Gauge for teaching to students. The skills include; identify the instrument used to measure rain fall, identify and source rain gauge and collection funnel from the market, identify the graduation cylinder, cite the rain gauge away from obstacles, keep top of rim of the gauge level for uniform collection of rain among others. This study is in agreement with that of Omeje and Asogwa (2013) on resource management skill improvement needs of women farmers in melon production for poverty reduction in Enugu, Nigeria. They found 13 skills in planning, 10 skills in pre-planting operations, 6 skills in planting operations, 7 skills in post planting and post harvesting operations, 7 skills on marketing operations and 28 skills in management of material resources. Such skills include; determine the right time for planting, test seeds for viability, dissolve appropriate fungicide in water for six hours, soak melon in the solution for 24 hours, mark space 1m between rows and 1m within rows and sow the soaked melon seeds 2-3 seeds per hole. Also Gertrude-Theresa, Francis, Vera and Alawa (2014) on their study on quality assurance and performance gap assessment of agriculture teacher in teaching yam production in Colleges of Education in Nigeria, found out that teachers needs skill improvement on 16 skills in planning and pre-planting operations, 16 skills in planting and post-planting operations and 15 skills in harvest operations. The skills include; select appropriate seedlings for planting, treat seedlings with appropriate chemicals, treat the face of the seedling with appropriate fungicide and plant yam at 1m x 1m space. Another study by Onu and Alaribe (2012) on work-skill needs of secondary school graduates in pineapple production for poverty reduction in South East Nigeria and found out 18 skills in planning and marketing of pineapple seedlings or fruits in pineapple production, 10 skills in pre-nursery operations in pineapple production, 8 skills in nursery operations and 10 skills in plantation establishment. The skills include: source pineapple plantlets that are well developed, site main nursery on a shade area free of water logging, make nursery beds on soil rich in organic matter, fumigate soil with an equal mixture of dichloro-propane to destroy nematodes and other destructive organisms, mulch the soil with black material such as polythene film or any relevant material among others.

In Table 4, it was found from the study that lecturers of Agricultural Education in Colleges of Education require improvement on 10 skills in using Evaporation meter for instructional delivery to students. The skill items include; identify the instrument used to measure evaporation- water loss, source evaporation meter from the market, install the evaporation meter on wooden pellet or platform, install the instrument 5cm above the ground level, cite the instrument in full sunlight among others. This result is in agreement with the study of Tafida, Gidado and Usman (2012) on competency needs of teachers of technical education in ICT for effective teaching in Federal Colleges of Education in North-East Nigeria. The study identified 15 skills on word processing, 13 skills on internet usage and 15 skills on power point presentation. Some of the skills are; click on the window start button to display the start menu, select all programmes, choose Microsoft word from the submenu, select file option, open existing document and modify, open a web browsing application, change the web browser home page/start page, visit any site to download any file, display a slide within a presentation that you wish to change, enter

text for the first bullet point, display a design on the clip board and save the modification. Another study that supports the research was that of Okwori, Adamu and Odo (2013) on evaluation of practical skills possessed by woodwork graduates of technical colleges in Niger State, Nigeria who found 8 skills in using woodworking machine. The skills include: use drilling machine to bore hole on a wood surface, use band saw machine to make curve shapes on wood surface, use jigsaw machine to make curved shapes on wood surface, use circular saw machine to rip wood surface among others.

Conclusion and Recommendations

Skills improvement required by lecturers of agricultural education in using some Agro-climatological Instruments in Colleges of Education in Adamawa and Taraba States, Nigeria are significantly important. The findings of this study revealed that lecturers of agricultural education require skill improvement in the using of Wind Vane, Anemometer, Rain Gauge and Sunshine Recorder. It can also be concluded that determining the skill improvement requirement of lecturers of agricultural education in Colleges of Education will bring to the fore these Agro-climatological instruments that lecturers require improvement. When their skills are improved upon will bring about the desired capabilities to use these Agro-climatological instruments in imparting practical skills in students of agricultural education. It was therefore recommended that:

1. Lecturers of Agricultural Education should seek for ways to improve their skills in using these Agro-climatological instruments for effective teaching of students.
2. The identified skills improvement required by lecturers of Agricultural Education should be made available to National Commission for Colleges of Education who will use the information to recommend to TET-Fund to grant the lecturers allowances or sponsorship to enable them attend skills improvement programmes nationally or internationally. and
3. Skill Acquisition Organizations should package the findings of this study into their capacity building programmes for re-training teachers of agriculture science in secondary schools in North-east Nigeria.

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