Availability, Adequacy, Utilization and Provision of School Laboratory Equipment for Teaching Agricultural Science in Senior Secondary Schools in Gombe State, Nigeria

Harrison Gideon Maghra[a*], Iliya Daniel[b], Amidu Aeneas Maipandi[c]

[a,b]*Department of Vocational and Technical Education, Adamawa State University Mubi, Nigeria*
[c]*Government Secondary School Okpoama, Brass L.G.A Bayelsa State, Nigeria*
[a]*Email: gideonharrison7878@gmail.com,* [b]*Email: iliyadaniel75@gmail.com*
[c]*Email: aeneasamidu12@gmail.com*

Abstract

The purpose of this study is to assess the availability, adequacy, utilization and provision of agricultural science laboratory equipment in senior secondary schools in Gombe state. The design of the study was a survey. A sample of 140, comprised of 75 and 65 Agricultural science teachers and school principals, respectively, was drawn from a population of 290. The instrument for data collection was structured questionnaire of 50 items on a four point rating scale, validated, in terms of especially appropriateness of response options and arrangement, by three experts, In order to determine the reliability of the instrument, it was trial tested on 20 teachers and principals in Bauchi State, the reliability coefficient obtained was 0.89 using Cronbach Alpha. Three research questions were posed, while, two null hypotheses were formulated and tested at 0.05 level of significance. The data collected were analysed using spss. Mean and standard deviation were used to answer the research questions, while t-test was used to test the null hypotheses at 0.05 level of significance. The findings of the study revealed that laboratory equipment are available and inadequate, there were underutilisation and poor provision of laboratory equipment for teaching Agricultural Science in Gombe State secondary schools. The study concluded by recommending that the available laboratory equipment should be fully utilised in teaching and learning of Agricultural science; laboratories should be adequately equipped to meet the WASSCE guidelines among others.

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* Corresponding author.

1. Introduction

The human race needs food for survival. This need can only be met through agriculture. World Bank recognises that agriculture will continue to be the major employer of labour, major source of food for the fast growing economy and population. The central bank of Nigeria also recognized that the agricultural sector alone has raised the GDP to 40%, yet is a sector that is hardly noticed for her production. If Nigeria as a nation was able to realize 60% GDP in 2006; it means a lot needs to be harnessed including the improved teaching of agricultural science. Agricultural science has been defined by [1] as the general application of scientific knowledge in the cultivation of crops, rearing of animals, storage of agricultural produce, processing and marketing of these produce to the final consumer. Knowledge on agricultural science should not be thought only theoretically but practically as well in laboratories [2]. The laboratory approach to teaching of science in general and agricultural science in particular is among the different attempts by science educators to bring about positive change in students' performance. Agricultural laboratory is defined as the application of techniques to control the growth and harvesting of animal and vegetable products [3]. Laboratory in schools has been defined by several authors in different ways. Reference [4] sees a laboratory as a place where scientific exercises are conducted by the science teachers for the benefit of the students (learners). The laboratory exercises include; experiments, and other activities which help the students in acquiring scientific skills. In the same vein, Reference [5] defined science laboratory as a workshop where science is done or where scientific activities are carried out under conducive environment. She also sees the laboratory as a place where science equipment, materials or instruments are housed for security and safety. Agricultural Education is the training of learners in the processes of agricultural productivity as well as in the techniques for the teaching of agriculture. "It is the teacher preparation in agricultural production and in pedagogical skills in agricultural subject areas" [6]. Agricultural education refers to the teaching of skills, values, attitudes, and related product [7]. Therefore, agricultural education is the type of education that is employed in training learners improved agricultural production process as well as in the techniques for the teaching of agriculture. It therefore, takes place at two levels, namely formal level which would take place at primary, secondary to graduate study in the university; and at informal level which goes on outside the formal school system. Agricultural science cannot be properly taught without adequate facilities and equipment, such as storage facilities, tractors, machine tools, and modern laboratory, computers. All these facilities are lacking in our secondary schools today. Reference [8] pointed out that the ultimate objective of vocation education is to train qualified technical personnel and skilled work force to meet the requirement of the society, regardless of how well the vocational education curriculum is prepared and how excellent the qualifications of the teachers are, inadequate facilities hamper the students learning in cognitive, affective and psychomotor domain. Practical work is a unique source of teaching and learning in science because science students are able to demonstrate certain aspects of the subject matter which has been learnt in class through lecture, discussions and textbooks. Hence, practical work provides students with opportunities to engage in processes of investigation and inquiry. Practical work also gives students appreciation of spirits and methods of problem solving, analytic and generalization ability [9]. Reference [10] posited that verbalism is the predominant method used by teachers in Nigerian schools. According to him, verbalism entails the use of words to convey concepts, principles and ideas, essentially through lecture and discussion. Reference

[10] further asserted that though, verbalism is an important method in teaching, but the problem in secondary schools may actually be non-availability of laboratory buildings and the required apparatuses for teaching the practical aspects of agriculture. There are situations where laboratories are seen without equipment. Under this situation, students may find it difficult to identify, use and maintain facilities and equipment during and after practical With the public outcry against poor performance of students in agricultural science in senior secondary examination, there is the need to assess secondary school's laboratory equipment so as to ascertain their status vis-a-vis their state in meeting teaching and learning needs that will lead to national development.

2. Statement of the Problem

Research has identified barriers to utilizing laboratories which may compound the issue of incorporating strategies to enhance scientific inquiry and problem solving. There are lots of difficulties in teaching of practical agriculture in secondary schools in Nigeria as a result of many factors, such as: the absence of farm tools and facilities in schools, the non-availability of school farm. Reference [11] pointed out that, many students in secondary schools graduate without participating in any single practical agriculture because of the non-availability of farm tools and facilities. There is no doubt that, agricultural science can best be thought using available demonstration plots and farms during practical work. Secondary schools require properly equipped and functional laboratories. When the students are taught agriculture theoretically, without teaching the practical aspects in the laboratory, the students will not learn properly. The implication of this is that the role of the laboratory on the academic achievement of the students in agriculture is being ignored. Consequently, the students will; lack scientific attitude, problem solving skills, scientific inquiry skills, acquisition of scientific skills, learn agriculture poorly, perform poorly in practical agriculture in internal and external examinations, probably could lead to poor performance among the students in senior secondary school. To buttress this point, the chief examiners reports of WAEC and NECO, 2013, 2014 and 2015 indicate poor performance of students in the sciences particularly agriculture in the state under study. Gombe state in 2013 WAEC performance in Nigeria recorded mass failure in agricultural science. 2014 WAEC results, however eight (8) out of the 36 states in Nigeria recorded a score less than 10%. These states includes Adamawa, Jigawa, Sokoto, Zamfara, and Kebbi states, others are Gombe and Bauchi. The statistics of the results released by the West African Examination Council for the May/June WASSCE 2014 shows that, Gombe state recorded 5.88%, Bauchi recorded 5.28% and Yobe 4.85%. 11th August 2015 WAEC result was released on line and the result came out on Monday August 10th, aside from Yobe state, seven other northern states occupied the rear positions in the rankings involving the 36 states and Abuja. They are Zamfara and Jigawa 36th, 35th, Gombe, 34th, Katsina, 33rd, Kebbi and 32nd, Bauchi. The poor performance of students in external examination may be attributed to lack of knowledge in practical agricultural science. Thus, the researcher assessed the availability, adequacy, utilization and provision of agricultural laboratory equipment in secondary schools in Gombe state.

3. Purpose of the Study

The main purpose of this research work was to assess school laboratory equipment for teaching agricultural science in senior secondary schools in Gombe state.

Specifically, the study sought to:

1. Determine the availability of school laboratories equipment for teaching agricultural science in senior secondary schools in Gombe state.
2. Determine the adequacy of the laboratory equipment for teaching agricultural science in senior secondary schools.
3. Determine the frequency of utilization of school laboratories for teaching agricultural science in senior secondary schools.

4. Research Questions

The study answered the following research questions:

1. What are the laboratory equipment available for teaching agricultural science in senior secondary schools in Gombe state?
2. How adequate are the laboratory equipment in agricultural science laboratories?
3. What is the frequency of utilisation of school laboratories by agricultural science teachers?

5. Hypotheses

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

Ho$_1$ There is no significant difference in the mean response of principals and teachers on the level of utilization of equipment in agricultural science laboratories.

Ho$_2$: There is no significant difference in the mean ratings of principals and teachers on the frequency of provision in using laboratory equipment in teaching practical agriculture in senior secondary schools.

6. Methodology

The study adopted a survey design research design. The study was conducted in Gombe State which has 11 local government areas. For ease of administration, the eleven (11) local governments were divided into   fourteen (14) area educational inspectorate offices, namely; Akko North and South, Balanga North and South, Billiri, Dukku, Funakaye/Nafada, Gombe North and South, Kaltungo West and East, Kwami, Shongom and Yamaltu Deba (Gombe State Ministry of Education, on field survey 2015). The population of the study was 290. This consisted of 175 agricultural science teachers and 115 principals in public senior secondary schools in Gombe state. Taro Yamane formula for finite population was used to draw the sample size of 140 people. This sample consisted of 75 agricultural science teachers and 65 principals respectively. The instrument for data collection was a check list, obtained from the West African Examinations Council (WAEC). The checklist is a guideline for Re-Inspection/Recognition of Schools and Subjects for the West African Senior School Certificate Examination (WASSCE). Fifty questionnaire items were developed by the researcher, the questionnaire was divided into two sections, A and B. Section A sought for personal information of the respondents, while section B sought information on the availability, adequacy, utilisation and provision of the equipment respectively. The

adopted check list was assumed to have been adequately validated by validates contacted by WASSCE. So there was no need for revalidating the list of the equipment that served as the instrument. However, three experts validated, not the list of items, but the appropriateness of response options and arrangement of the questionnaire. The instrument was trial tested by administering the questionnaire to 20 respondents comprising of 10 agricultural science teachers and10 school principal from Bauchi State outside the study area. Cronbach Alpha was used to determine the reliability of the instrument. The reliability coefficient of the instrument was found to be 0.89. This indicated that is reliable and good for the study. The researchers administered the questionnaire and collected them back. The data collected was analysed in two phase-analyses of the research questions and the hypotheses. Mean and standard deviation were used to answer the research question while t-test was used to test the hypotheses at 0.05 level of significance using spss.

7. Results

Research question 1

What are the laboratory equipment available for teaching agricultural science in senior secondary schools in Gombe state?

Table 1: Availability of laboratory equipment for teaching Agricultural science in senior secondary schools

S/N	List of laboratory equipment	Standard Qty	Qty Av.	Remark
1.	Water troughs	5	0	Not Available
2.	Feeding troughs	5	0	Not Available
3.	Hurricane lanterns	10	0	Not Available
4.	Watering cans	5	5	Available
5.	Hoes	50	100	Available
6.	Cutlasses	50	80	Available
7.	Spades	5	5	Available
8.	Garden forks	5	5	Available
9	Wheel barrows	2	0	Not Available
10	Axes	2	7	Available
11	Head pans	5	5	Available
12	Saws	2	0	Not Available
13	Hammers	2	0	Not Available
14	Diggers	2	2	Available
15	Hand trowels	4	6	Available
16	Secateurs	2	0	Not Available
17	Mattocks	2	0	Not Available
18	Sickles	2	6	Available
19	Measuring cylinders	50	50	Available
20	Filter funnels	50	50	Available
21	Filter paper	2 pkts of medium type	2 pkts of medium type	Available

No	Item	Qty (Guideline)	Qty (Available)	Remark
22	Soil sieves	2	0	Not Available
23	Litmus paper	2 pkts of blue	2 pkts of blue	Available
24	Cotton wool	3 rolls	2 rolls	Available
25	Budding knife	1	1	Available
26	Insects boxes	5	5	Available
27	Office pins	1 pkt	1 pkt	Available
28	Files	2	2	Available
29	Spanners	2	0	Not Available
30	Screw drivers	2	0	Not Available
31	Lubricant	1 gallon	0	Not Available
32	Pliers	2	2	Available
33	Pincers	2	2	Available
34	Cribs	1	0	Not Available
35	Chart showing diff. Areas of agriculture e.g. Animal science, agronomy etc.	1	0	Available
36	Jam jars	50	0	Not Available
37	Notice board for pasting bits of hide, wool etc.	1	1	Available
38	Water fountains	10	0	Not Available
39	Charts for weeds, insects, plant system etc.	2	2	Available
40	Herbicides round up	1 litre	0	Not Available
41	Microscopes	5	5	Available
42	Charts of the systems in the body of farm animals	5	0	Not Available
43	Knap-sack sprayer	1	1	Available
44	Simple sprayers	5	0	Not Available
45	Fertilizers	2 bags	2 bags	Available
46	Fishing equipment	26	0	Not Available
47	Conical flask	50	54	Available
48	Ranging poles	4	0	Not Available
49	Petri dishes	50	0	Not Available
50	Farm space	1400 sqm/class	140sqm/class	Available

Key: Qty = Quantity   Av =   Available

The checklist presented on table 1 compared the availability of equipment for teaching Agricultural Science in secondary schools based on the guidelines for Re-Inspection/Recognition of Schools and Subjects for the WASSCE.

Research question 2

How adequate are the laboratory equipment in agricultural science laboratories?

Table 2: The adequacy of laboratory equipment for teaching Agricultural science in senior secondary schools

S/N	List of laboratory equipment	Standard Qty	Qty Av.	Remark
1.	Water troughs	5	0	Not Adequate
2.	Feeding troughs	5	0	Not Adequate
3.	Hurricane lanterns	10	0	Not Adequate
4.	Watering cans	5	0	Not Adequate
5.	Hoes	50	0	Not Adequate
6.	Cutlasses	50	0	Not Adequate
7.	Spades	5	0	Not Adequate
8.	Garden forks	5	0	Not Adequate
9	Wheel barrows	2	0	Not Adequate
10	Axes	2	0	Not Adequate
11	Head pans	5	0	Not Adequate
12	Saws	2	0	Not Adequate
13	Hammers	2	0	Not Adequate
14	Diggers	2		Adequate
15	Hand trowels	4	0	Not Adequate
16	Secateurs	2	0	Not Adequate
17	Mattocks	2	2	Adequate
18	Sickles	2	2	Adequate
19	Measuring cylinders	50	50	Adequate
20	Filter funnels	50	50	Adequate
21	Filter paper	2 pkts of medium type	0	Not Adequate
22	Soil sieves	2	2	Adequate
23	Litmus paper	2 pkts of blue	2	Adequate
24	Cotton wool	3 rolls	0	Not Adequate
25	Budding knife	1	1	Adequate
26	Insects boxes	5	0	Not Adequate
27	Office pins	1 pkt	0	Not Adequate
28	Files	2	2	Adequate
29	Spanners	2	2	Adequate
30	Screw drivers	2	2	Adequate
31	Lubricant	1 gallon	0	Not Adequate
32	Pliers	2	0	Not

S/N		Qty Av		Remark
33	Pincers	2	5	Not Adequate
34	Cribs	1	0	Not Adequate
35	Chart showing diff. Areas of agriculture e.g. Animal science, agronomy etc.	1	0	Not Adequate
36	Jam jars	50	0	Not Adequate
37	Notice board for pasting bits of hide, wool etc.	1	0	Not Adequate
38	Water fountains	10	0	Not Adequate
39	Charts for weeds, insects, plant system etc.	2	0	Not Adequate
40	Herbicides round up	1 litre	1 litre	Adequate
41	Microscopes	5	5	Adequate
42	Charts of the following systems in the body of farm animals	5	0	Not Adequate
43	Knap-sack sprayer	1	0	Not Adequate
44	Simple sprayers	5	0	Not Adequate
45	Fertilizers	2 bags	0	Not Adequate
46	Fishing equipment	26	0	Not Adequate
47	Conical flask	50	0	Not Adequate
48	Ranging poles	4	0	Not Adequate
49	Petri dishes	50	0	Not Adequate
50	Farm space	1400 sqm/class	0	Not Adequate

Key: Qty = Quantity   Av =   Available . Table 2 presents the checklist on adequacy of laboratory equipment. The table 2 revealed that all the equipment for teaching Agricultural Science in secondary schools, as provided by the guidelines for Re-Inspection/Recognition of Schools and Subjects for the W ASSCE, were not adequate.

Research question 3

What is the frequency of utilisation of school laboratories by agricultural science teachers?

Table 3: Means and standard deviations on the frequency of utilisation of laboratory equipment for teaching Agricultural science in senior secondary schools

S/N	List of laboratory equipment	Teachers, N = 75		Principals, N = 65			Remark
		$\bar{X}_T$	SD	$\bar{X}_P$	SD	$\bar{X}_G$	
1.	Water troughs	1.25	0.59	1.08	0.27	1.16	Not Used
2.	Feeding troughs	1.00	0.00	1.04	0.20	1.02	Not used
3.	Hurricane lanterns	1.09	0.38	1.17	0.53	1.14	Not Used
4.	Watering cans	1.85	1.18	1.31	0.68	1.56	Not Used
5.	Hoes	1.38	0.93	1.08	0.32	1.22	Not used

No.	Equipment	$\bar{X}_T$	SD	$\bar{X}_P$	SD	$\bar{X}_G$	Remark
6.	Cutlasses	1.22	0.70	1.15	0.36	1.18	Not Used
7.	Spades	1.15	0.54	1.07	0.30	1.11	Not Used
8.	Garden forks	1.18	0.58	1.17	0.55	1.18	Not Used
9	Wheel barrows	1.15	0.36	1.33	0.72	1.25	Not Used
10	Axes	1.06	0.35	1.07	0.34	1.06	Not Used
11	Head pans	1.00	0.00	1.13	0.34	1.07	Not Used
12	Saws	1.00	0.00	1.33	0.47	1.18	Not Used
13	Hammers	1.00	0.00	1.17	0.38	1.09	Not Used
14	Diggers	2.00	0.00	1.96	0.20	1.98	Not Used
15	Hand trowels	1.17	0.38	1.71	0.46	1.46	Not Used
16	Secateurs	1.15	0.51	1.16	0.49	1.16	Not Used
17	Mattocks	1.06	0.24	1.12	0.33	1.09	Not Used
18	Sickles	1.08	0.27	1.03	0.16	1.05	Not Used
19	Measuring cylinders	1.00	0.00	1.08	0.36	1.04	Not Used
20	Filter funnels	1.42	0.56	1.17	0.45	1.29	Not Used
21	Filter paper	1.00	0.00	1.28	0.61	1.15	Not Used
22	Soil sieves	1.68	0.79	1.63	0.77	1.65	Not Used
23	Litmus paper	1.32	0.69	1.73	0.92	1.54	Not Used
24	Cotton wool	1.20	0.40	1.43	0.50	1.32	Not Used
25	Budding knife	1.08	0.27	1.09	0.29	1.09	Not Used
26	Insects boxes	1.05	0.21	1.67	0.47	1.38	Not Used
27	Office pins	1.15	0.36	1.13	0.13	1.14	Not Used
28	Files	1.31	0.73	1.40	0.81	1.36	Not Used
29	Spanners	1.15	0.44	1.05	0.32	1.10	Not Used
30	Screw drivers	1.25	0.43	1.45	0.70	1.36	Not Used
31	Lubricant	1.14	0.35	1.33	0.66	1.24	Not Used
32	Pliers	1.05	0.21	1.12	0.43	1.09	Not Used
33	Pincers	1.15	0.36	1.23	0.56	1.19	Not Used
34	Cribs	1.18	0.39	1.00	0.00	1.09	Not Used
35	Chart showing diff. Areas of agriculture e.g. Animal science, agronomy etc.	1.37	0.49	1.27	0.45	1.31	Not Used
36	Jam jars	1.43	0.50	1.37	0.49	1.40	Not Used
37	Notice board for pasting bits of hide, wool etc.	1.58	0.50	1.55	0.53	1.56	Not Used
38	Water fountains	1.86	0.88	1.81	0.85	1.84	Not Used
39	Charts for weeds, insects, plant system etc.	1.57	0.83	1.56	0.79	1.56	Not Used
40	Herbicides round up	1.15	0.51	1.19	0.51	1.17	Not Used
41	Microscopes	1.37	0.70	1.19	0.46	1.27	Not Used
42	Charts of the following systems in the body of farm animals	1.11	0.47	1.00	0.00	1.05	Not Used
43	Knap-sack sprayer	1.00	0.00	1.00	0.00	1.00	Rarely Used
44	Simple sprayers	1.02	0.12	1.17	0.55	1.10	Not Used
45	Fertilizers	1.22	0.52	1.19	0.39	1.20	Not Used
46	Fishing equipment	1.20	0.40	1.17	0.38	1.19	Not Used
47	Conical flask	1.28	0.57	1.20	0.43	1.24	Not Used
48	Ranging poles	1.20	0.40	1.17	0.38	1.19	Not Used
49	Petri dishes	1.31	0.53	1.17	0.38	1.24	Not Used
50	Farm space	1.34	0.71	1.17	0.38	1.25	Not Used
Grand Mean		**1.24**	**0.43**	**1.26**	**0.44**	**1.25**	**Not Used**

$\bar{X}_T$ = **mean of teachers**, $\bar{X}_P$ = **mean of principal**, $\bar{X}_G$ = **Grand mean**, SD = **standard deviation**

Table 3 presents the analysis on the frequency of utilisation of school laboratory equipment. The mean responses of the respondents to the items revealed that, although there are few equipment available in Agricultural Science laboratory in secondary schools in Gombe State, but they were not been used by teachers for teaching and learning of Agricultural Science.

Hypothesis 1

There is no significant difference in the mean response of principals and teachers on the frequent utilization of equipment in agricultural science laboratories.

Table 4: t-test analysis on the mean response of principals and teachers on the frequent utilization of Agricultural laboratory equipment

Group	$\bar{X}$	δ	N	Df	t-cal	t-table	Decision
Teacher	1.26	0.54	75	138	0.08	1.96	Accepted
Principal	1.24	0.55	65				

Key: Df = Degree of freedom, t-cal = t calculated value, t-table = t table value,

δ = Standard Deviation, $\bar{X}$ = Mean

Table 4 presents t-test analysis on the mean response of principals and teachers on the frequent utilization of laboratory equipment for teaching and learning Agricultural science.

Hypothesis 2

There is no significant difference in the mean ratings of principals and teachers on the frequent provision of laboratory equipment in teaching practical agriculture in senior secondary schools.

Table 5: t-test analysis on the mean response of principals and teachers on the frequent provision of Agricultural laboratory equipment

Group	$\bar{X}$	δ	N	Df	t-cal	t-table	Decision
Teacher	1.25	0.51	75	138	1.92	1.96	Accepted
Principal	1.02	0.47	65				

Key: Df = Degree of freedom, t-cal = t calculated value, t-table = t table value,

δ = Standard Deviation, $\bar{X}$ = Mean

Table 5 presents t-test analysis on the mean response of principals and teachers on the frequent provision of laboratory equipment for teaching and learning Agricultural science.

8. Discussions

The discussion of the finding follows the pattern in which the research questions were analysed. The analysis on research question one focussed on the availability of equipment in Agricultural science laboratories in Gombe

State. The checklist revealed that few equipments are available for teaching and learning Agricultural Science laboratories. The finding concurred with the work of [12] who found out that there are inadequate equipment in Agricultural Science laboratories for the teaching Agricultural science. The finding agreed also with the finding of [13] who found out that material tools and equipment are moderately available in colleges. Although, [12] submitted that the available Agricultural equipment claimed by some teachers and school administrator are obsolete, inadequate or are underutilised in many respect. Research question two addressed the adequacy of equipment in the Agricultural science laboratories. The finding that emerged from this research question was that equipment are inadequate for teaching and learning of Agricultural Science. This finding was in consonance with that of [14] who admitted that there was grossly inadequate equipment, tool and material in Agricultural Science laboratories for effecting demonstration of Agricultural science practical to students. He insisted that, the few equipment in the laboratories are not enough for teaching and learning especially in practical classes. Research question three focused on utilization of equipment in Agricultural Science laboratory. The finding revealed that the equipment found in Agricultural Science laboratories are not fully utilised. This finding was in agreement with finding of [12] who in their submission stated that the level of utilisation of equipment and tool for teaching Agriculture was very low. They also stressed that level of utilisation might be unconnected with state of good working condition of the equipment and lack of knowledge of operating some equipment. Similarly, the findings of [15,16] also concurred with current finding, where he noted the few equipment and tools commonly found in the schools' laboratory and workshops are underutilised. Additionally, Reference [17] also noted gross under-utilisation of equipment for teaching and learning practical skills in secondary schools. Reference [2,16] jointly enjoined teachers to utilise the available equipment so as to reduce level of deterioration of equipment due to redundancy. With regard to the hypotheses, the test of all the null hypotheses revealed there is no significant difference in the mean responses of principals and teachers on the availability, adequacy, frequent utilisation, and frequent provision of teaching equipment in agricultural science laboratories. These findings conceded with outcome of many researchers. Among other were [12,17,18,13] who shared similar view that no significant differences existed between the teachers, students, school administrators, rural and urban schools on the availability, adequacy, utilisation and provision of educational materials and facilities for teaching.

9. Conclusion

Based on the findings of the study, the researcher concludes the equipment are available for teaching and learning in Agricultural science laboratories in Gombe state. Although the equipments are available, but are inadequate and poor utilisation and provision, on regular bases, of laboratory equipment in Gombe state senior secondary schools. From the observation in this study Agricultural science laboratory equipment is a prerequisite to students' enhanced academic performance in Agricultural science in Gombe state senior secondary schools. However, most of the equipment available in the laboratories are not been fully utilised.

10. Recommendations

The following recommendations were proffered in line with findings of the study:

1. The available laboratory equipment should be fully utilised in teaching and learning of Agricultural science.

2. Laboratories should be adequately equipped to meet the WASSCE guidelines.

3. Provision of modern equipment for teaching and learning Agricultural science should be made on regular bases.

References

[1]. C. O.Solomon, E. Elias, and G. N. Wagbara. "Agricultural Science for Senior Secondary School 3" Tanus Books   Limited, 2012.

[2]. S. A. James. "Problem in the Teaching of Agricultural Science Practical's in Selected Secondary Schools in Ikere Local Government Area of Ekiti State". Journal of Research in Vocational and Technical Education, vol. 3(2), pp. 15 – 31. 2015.

[3]. U. Simon. "A Handbook of Laboratory Analysis in Agriculture and Biological Sciences" Fab. Nig Ltd Awka, Jan, 2010.

[4]. M. A. Maduabum. "Teaching Biology Effectively"2nd Edition. Owerri and White Publishers. 1992.

[5]. R. Ezeliora. "A Guide to Practical Approach to Laboratory Management and Safety Precautions" Daughters of Divine Love Congregations: Enugu: Divine Love Publishers. 2011

[6]. S.O. Olaitan. "Training Students for Agricultural Occupation. A Paper Presented at NERA Conference, Benin, Nigeria, November 5-8. 1998.

[7]. P.E. Egbule. "Fundamentals & Practice of Agricultural Education' Owerri: Totan. Publishers Ltd. 2004

[8]. E. C. Osuala. "Foundation of Vocational Education" Enugu: Cheston Agency Ltd. 2004.

[9]. I. Abraham, R. Michael and S Rachael. "The Assessment of Practical Work in School Science" vol 49, pp209, 2013.

[10]. B.M. Ndomi. "Exploiting the Environment for Effective Teaching of Science Subject in Nigerian Schools and College" presented at STAN Conf. Taraba State Chapter Nigeria, 8th Feb 2005.

[11]. C. Nwankor. Class Lecture, Topic "Methods and Effective Skills to Develop in Vocational and Technical Subjects in Secondary Schools in Nigeria" Department of Technology Education, Federal University of Technology Yola, Nigeria ,Feb 11, 1991.

[12]. J. S. Owoeye and P. O. Yara. "School Facilities and Academic Achievement of Secondary School Agricultural Science in Ekiti state, Nigeria" Asian Social Science, vol7(7), pp 64-74, 2011.Retrieved from: www.ccsenet.org/ass

[13]. S. S. Manabete and A. A. Makinde. "Availability and Utilization of Facilities of Electrical Installation and Maintenance Works Programme of Technical Colleges in North-east Geo-political Zone of Nigeria" International Journal of Vocational and Technical Education Research, vol2(1), pp. 11-31, 2016.

[14]. S. I. Akinsade. "Strategies for Improving the Teaching of Agricultural Science in Secondary Schools" M. Ed thesis, Federal University of Technology Yola, Nigeria,2005.

[15]. P. S. Kelegha. "Problems of Practical Skills Acquisitions Among Building Trades Students in Vocational Training Centre and Technical Colleges" M. Ed thesis, Federal University of Technology Yola, Nigeria,2008.

[16]. B. E. Uwameiye. "Availability and Utilization of Tools and Equipment for Teaching and Learning Garment Making Trade in the Senior Secondary Schools in Edo State" International Journal of Humanities Social Sciences and Education (IJHSSE), vol. 3(3) pp. 12-18, 2016.

[17]. E. T. Akhihiero. "Effect of Inadequate Infrastructural Facilities on Academic Performance of Students of Oredo Local Government Area of Edo State. The Nigerian Academic Forum, vol. 20 (1) pp. 1-6, 2011.

[18]. J.E. Ogbu. "Influences of Inadequate Instructional Materials and Facilities in Teaching and Learning of Electrical/Electronic Technology Education Courses. Journal of Education and Practice, vol. 6 (33) pp. 40-46,2015.