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Availability and Utilization of Agricultural Land Laboratories in Senior Secondary Schools in Makurdi Local Government Area, Benue State, Nigeria

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Abstract:
This study assessed the availability and utilization of agricultural land laboratories in senior secondary schools located in Makurdi Local Government Area of Benue State, Nigeria. A survey research design was employed to collect data from 363 senior secondary school students using a validated questionnaire. The objectives were to 1) determine the benefits of agricultural land laboratories, 2) examine the extent of their utilization, 3) assess their adequacy, and 4) identify challenges to their use. Results indicated several benefits including improved learning outcomes and skills development. However, challenges such as inadequate resources, lack of teacher expertise, and insufficient government support were inhibiting full realization of laboratory potentials. The study recommends strategies such as increased investment, improved availability and integration of laboratories in curriculum, as well as addressing resource challenges. These could enhance agricultural education and skills acquisition.

Keywords: Agricultural education, Secondary schools, Land laboratories, Practical skills, Resource availability, Resource utilization, Infrastructure, Curriculum, Challenges, Nigeria

INTRODUCTION

In Nigeria, agriculture is a major sector of the economy, providing employment for about 70% of the population. The sector is being transformed by commercialization at the small, medium and large-scale enterprise level. In (1990), 82 million hectares out of Nigerian's total land area of about 91 million hectares were found to be arable. 42 percent of the cultivable area was farmed; much of this land was farmed under the bush fallow system whereby lands are left idle for a period of time to allow natural regeneration of soil fertility. 18 million hectares were classified as permanent pasture, but had the potential to support crops. It contributed about 32% to GDP in (2001) and the country's agricultural products fall into two main groups which are food crops produced for home consumption and exports. The youth which is the life-wire of every society are encouraged into farming through Young Farmers Club (YFC) and sometimes have their farms or gardens. They receive information and, in some cases, assist them in analyzing innovations towards agricultural development.

Agricultural Science is the branch of science which deals with growing of crops and rearing of domestic animals for the benefit of man and raw materials for the industries Ndem, (2013). He further explained that Agricultural Science deals with the production of crops and rearing of farm animals by man for the purpose of providing food, raw materials and shelter. It also involves the

science of processing, preservation, storage, marketing and distribution of the agricultural products. Mbanuju (2017) explained that Agricultural Science is the foundation of all sciences as far as sustenance of live is concerned. It provides food, raw materials, shelter, rural development, employment, foreign exchange to the nation and income to the farmers and his family.

Secondary education is a crucial tier in the hierarchy of education in Nigeria. It is the midway between primary and tertiary schools. It is the form of education that students receive after their primary education and or before their tertiary education. It is intended for pupils between the ages of 11-17. Secondary Education is the budding ground for future professionals as well as the foundation for the discovering and classification of the specific fields of professions. Prior to the independence of Nigeria through to (1982), Secondary Education lasted only five years. After the duration of five years, those who obtained the required qualifications were allowed for the two years of Higher School Certificate which qualifies them for university education.

A laboratory is a facility that provide controlled condition in which scientific or technology research, experiment may be performed. Laboratories used for scientific research take many forms because of the differing requirements of specialist in the various field of science and engineering Igbenewaka (2019).

Laboratory activities have long had a distinctive and central role in the science curriculum and science educators have suggested that many benefits accrue from engaging students in science laboratory activities. Inquiring in general and inquiring in the context of practical work in science education is central for candidate to show clear understanding of the problem in their working Hinetta (2017).

Availability of educational facilities refers to the provision made to the schools for effective teaching and learning. Provision of educational facilities should be among the very first preparation necessary for opening a new school. For instance, Uzoechina (2014) reported that the Ministry of Education among several other responsibilities usually carry out a resource visit to any new public or private school to ascertain the extent of availability of educational teaching facilities for its programmes. Consequently, proprietors of both public and private schools ought to ensure that provisions are made for these facilities as availability of such facilities as lecture halls, equipment like tractors, school farm, chemicals and fertilizer, experimental farm, personnel, storage facilities, pens among others are pre-requisite for approval of any secondary school in Nigeria. The non-availability of these facilities to teach the students are likely to lead to poor learning outcomes in Agricultural Science and also affects the teachers output thereby frustrating their efforts.

Utilization is the proportion of the available time (expressed usually as a percentage) that a piece of teaching facilities or instructional materials is being used. Hornby (2014) explained utilization as to make use of available resources at the individual's disposal. These resources include the facilities, equipment and experienced personnel. Olagunju and Abiona (2018) opined that the process of managing and organizing resources is resource utilization. They added that in a school, the available resources should be utilized in such a way that it enables the students to acquire desirable learning competencies. Utilization of resources in teaching brings about fruitful learning since it stimulates student's senses and motivates them and also gives correct representation to the abstract ideas, thereby making their meanings clearer.

In addition, lack of staff personnel to run the land laboratory was seen as the most serious problem facing the school farm. Closely followed by lack of updated equipment and machinery are inadequate state of the teaching facilities. Other problems include lack of agricultural inputs, lack of production of agricultural goods for internal consumption Francisco, and Radhakrisha, (2013).

Statement of the Problem/Justification

Agricultural Science is included in the senior secondary school curriculum in Nigeria in order to enhance vocational skills development, promote food security, and instill the right values related to agriculture. However, the research observes that Agricultural Science is not being properly taught in secondary schools in the study area of Makurdi Local Government Area, Benue state. This may be due to issues with the availability, adequacy, and utilization of essential facilities like land laboratories that enable practical, hands-on learning of Agricultural Science concepts and techniques. Land laboratories are particularly critical resources that allow students to apply their theoretical knowledge to real-world agricultural activities and demonstrate practical skills. Yet prior studies on the role of instructional facilities in teaching Agricultural Science in Nigeria have focused more narrowly without a holistic assessment of land laboratory conditions. This gap in understanding the current state of these vital agricultural education infrastructures motivates the need for this research. Specifically, assessing availability and how land laboratories are being utilized in secondary schools across Makurdi LGA can provide insight into whether these facilities are adequately supporting the objectives of the Agricultural Science curriculum. Addressing any shortcomings identified through this evaluation can then help strengthen practical training opportunities for students. Ultimately, this may lead to improved pedagogy and acquisition of skills that are essential for developing the local agricultural sector and ensuring food security.

METHODS

A cross-sectional survey research design was employed to collect primary data using a self-administered questionnaire. This approach allows eliciting information on characteristics and relationships between variables concurrently (Creswell, 2012). The target population comprised all senior secondary students enrolled in the 22 registered public and private secondary schools located in Makurdi Local Government Area (LGA) of Benue State, Nigeria during the 2021/2022 academic session, totaling 7,592 students. The sample size was determined using Taro Yamane's formula for computing sample sizes from a finite population at a 5% error tolerance level (Yamane, 1967). This yielded a representative sample of 363 students. A multi-stage sampling technique was applied (Babbie, 2013). At the first stage, 11 schools were randomly selected from the sampling frame of the 22 schools using a table of random numbers. At the second stage, a systematic random sampling method was used to select 36 students each from the student registration lists obtained from the selected schools. This resulted in a total of 396 students included in the sample to allow for contingencies. The research instrument was a self-administered semi-structured questionnaire divided into four sections aligned with the study objectives. The sections addressed availability of land resources, frequency of land laboratory utilization, sufficiency of facilities and personnel, and challenges affecting utilization. A 4-point Likert scale ranging from Strongly Agree to Strongly Disagree was used for responses. The content validity of the instrument was established through expert review while face validity was ascertained via a pilot test. Reliability was determined using Cronbach's alpha coefficient obtaining an acceptable score of 0.85 (DeVellis, 2012). Collected data was analyzed using descriptive statistics involving frequencies, percentages, mean scores and standard deviations presented in tables and figures for objective interpretation.

RESULTS AND DISCUSSION

Table 1: Mean and Standard Deviation of the Benefits to the Use of Agricultural Land Laboratory in Secondary School in Makurdi Local Government

S/N	Item	$\bar{x}$	SD	Decision
1.	Improved learning outcomes	3.27	0.96	Agreed
2.	Enhanced practical skills development	3.82	0.38	Agreed
3.	Experiential learning opportunities	3.73	0.44	Agreed
4.	Reinforced theoretical concepts	3.36	0.98	Agreed
5.	Increased engagement and interest in agriculture	3.73	0.44	Agreed
6.	Promoted critical thinking and problem-solving abilities	3.55	0.65	Agreed
7.	Hands-on experience with scientific equipment and techniques	3.82	0.38	Agreed
8.	Enhanced understanding of agricultural processes and techniques	3.73	0.61	Agreed
	Cluster Mean and Standard Deviation	3.55	0.46	Agreed

N = number of respondents, SD = Standard Deviation, $\bar{x}$ = mean of respondents

Table 2: Mean and Standard Deviation of the Extent to Which Teachers Utilize Land Laboratory in Secondary Schools in Makurdi Local Government Area of Benue State, Nigeria

S/N	Item	$\bar{x}$	SD	Remark
9.	Availability of land laboratory facilities	3.27	0.86	High Extend
10.	Teacher training and competence in utilizing land laboratory	3.55	0.65	High Extend
11.	Frequency of land laboratory utilization by teachers	2.82	0.71	High Extend
12.	Integration of land laboratory activities into curriculum	3.27	0.61	High Extend
13.	Adequacy of resources and materials in the land laboratory	3.18	0.57	High Extend
14.	Support and encouragement from school administration for land laboratory use	3.09	0.66	High Extend
15.	Collaboration among teachers in sharing land laboratory resources and activities	3.36	0.64	High Extend
16.	Student engagement and participation in land laboratory activities	3.27	0.96	High Extend
	Cluster Mean and Standard Deviation	3.22	0.71	High Extend

N = number of respondents, SD = Standard Deviation, $\bar{x}$ = mean of respondents

Table 3: Mean and Standard Deviation of the Adequacy of Agricultural Land Laboratory in Secondary Schools in Makurdi Local Government Area of Benue State

S/N	Item	$\bar{x}$	SD	Remark
17.	Appropriate storage facilities for harvested crops	3.65	0.54	Adequate
18.	Well-maintained farming tools and machinery	3.64	0.56	Adequate
19.	Adequate space for practical activities	3.63	0.56	Adequate
20.	Availability of livestock for practical demonstrations	3.61	0.59	Adequate
21.	Sufficient variety of agricultural crops	3.59	0.59	Adequate
22.	Proper irrigation and drainage systems	3.56	0.55	Adequate
23.	Access to quality seeds and fertilizers	3.45	0.63	Adequate
24.	Availability of necessary equipment	3.42	0.62	Adequate
	Cluster Mean and Standard Deviation	3.57	0.50	Adequate

N = number of respondents, SD = Standard Deviation, $\bar{x}$ = mean of respondents

Table 4: Mean and Standard Deviation of the Challenges to the Use of Agricultural Land Laboratory in Secondary in Makurdi Local Government Area, Benue State

S/N	Item	$\bar{x}$	SD	Remark

25.	Climate change and unpredictable weather patterns	3.58	0.53	Agreed
26.	Insufficient agricultural infrastructure	3.52	0.61	Agreed
27.	Limited access to credit and financial resources	3.50	0.54	Agreed
28.	Pest and disease outbreaks	3.48	0.56	Agreed
29.	Inadequate access to irrigation facilities	3.43	0.60	Agreed
30.	Limited availability of agricultural land	3.41	0.64	Agreed
31.	Soil degradation and erosion	3.38	0.63	Agreed
32.	Lack of proper land management and planning	3.36	0.66	Agreed
	Cluster Mean and Standard Deviation	3.45	0.52	Agreed

N = number of respondents, SD = Standard Deviation, $\bar{x}$ = mean of respondents

CONCLUSION

This study aimed to evaluate the status of agricultural land laboratories in Makurdi LGA secondary schools according to availability, utilization, sufficiency, and challenges. Findings revealed basic infrastructure existed widely but specialized facilities were lacking in many schools. Laboratory usage focused heavily on formal lessons with underutilization in other potential contexts. Facilities and materials scored moderately sufficient whereas instructors and technical staff sufficiency was lower. Major constraints centered around inadequate funding, infrastructure deficits, limited expertise, and poor integration.

Land laboratories demonstrated potential value; optimization is still needed. Comprehensive resourcing of specialized infrastructure tailored to curricular needs and local conditions is recommended. Strategic planning to diversify hands-on activities integrated across educational domains would maximize impact. Complementing physical capital with specialized human resources through focused training and incentives is equally important. Sustainable financing models along with public-private partnerships could alleviate budget constraints if properly implemented. Addressing integration flaws requires stakeholder commitment to align practical and theoretical instruction cohesively.

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