
EVALUATING OF THE AVAILABILITY AND PEDAGOGICAL APPLICATION OF INSTRUCTIONAL RESOURCES IN THE TEACHING AND LEARNING OF AGRICULTURAL SCIENCE IN SECONDARY SCHOOLS IN RANO EDUCATION ZONE, KANO STATE, NIGERIA

Idi Garba (PhD)

Department of Science and Technology Education, Faculty of Education,
Bayero University, Kano, Nigeria
idigarba926@yahoo.com; +2348065991335

Abstract

Agriculture involves both the practical and scientific processes of crop cultivation and the rearing of domesticated animals for economic gain. This research focused on examining the extent to which instructional materials are available and utilized in the teaching and learning of Agricultural Science in secondary schools located within the Rano Education Zone of Kano State. The study employed a descriptive survey research design and was guided by four formulated research questions. The target population comprised 93 Agricultural Science teachers from secondary schools offering the subject in the designated education zone. Data were gathered using a structured questionnaire developed by the researcher, organized into five sections labelled A through E. Section A collected demographic information about the respondents, while Sections B to E contained items aligned with the research questions. To ensure the instrument's validity, it was reviewed by three subject matter experts. For reliability testing, a pilot study was conducted in six schools outside the main study area but with similar characteristics. Using Cronbach's Alpha, a reliability coefficient of 0.87 was established. Upon validation, the questionnaire was administered to the respondents, and the data collected were analyzed using mean scores and standard deviation. Findings indicated that instructional materials for Agricultural Science were generally available and in use, although notable exceptions included laboratory facilities, tractor implements, television sets, and overhead projectors. The study recommended that both Non-Governmental Organizations and the Kano State Government should intensify efforts to provide adequate instructional resources to enhance the teaching and learning of Agricultural Science in secondary schools.

Keywords: Agricultural Science, Instructional Materials, Teaching, Learning

Introduction

Agriculture encompasses both the practice and science of growing crops and raising domesticated animals for economic benefits. In Nigeria, Agricultural Science has been incorporated into the senior secondary school curriculum to promote the development of vocational skills, instil positive values, and support national food security. Secondary education serves as a critical link between primary and tertiary education. Recognizing its significance, the Federal Government of Nigeria outlined the main goals of secondary education as equipping students for meaningful participation in society and preparing them for further education (FRN, 2013).

The secondary school curriculum includes various subjects designed to help students lead productive lives and pursue advanced learning. Agricultural Science is one of the key subjects that support the realization of these goals (Obongekpe, 2020). It provides students with essential occupational skills relevant to the agricultural sector. Vocational agriculture, a branch of vocational education, emphasizes the knowledge, skills, and attitudes needed for employment in agricultural fields.

The primary objective of teaching vocational agriculture at the secondary level is to ensure that students gain fundamental competencies related to agricultural production. This includes engaging students in hands-on activities that foster practical understanding and skill development. Practical instruction is vital for helping learners become self-reliant and socially relevant. However, in many cases, Agricultural Science is taught largely in theoretical terms, limiting its impact and relevance to societal needs (Obongekpe, 2020). Effective teaching and learning of Agricultural Science require access to adequate practical instructional resources, including farm implements, tractors, machinery, functional laboratories, and demonstration farms. Unfortunately, many secondary schools lack these essential facilities (Abubakar, 2023).

Instructional materials are teaching facilities used by teachers to enhance the teaching and learning processes for better comprehension of the lesson by students. They are physical objects that aid the teacher in making teaching meaningful to the students (Amos et al. 2022). Instructional materials help the teacher to make meaningful explanation of the lesson and make complex concepts clearly understood by the learners. (Ekwulu et al. 2025). Instructional materials are classified based on their characteristics. They are made up of visual instructional material, audio instructional materials and audio-visual instructional materials. Visual instructional material is anything which helps the students to see better, using diagrams or pictures to explain better which appeal to the sense of sight only. Examples include chalkboard or whiteboard, graphs, models, map, diagrams, pictures, charts, models, and specimen or real objects. Audio instructional materials are materials on which sounds are stored or recorded and can be reproduced or played back mechanically, electronically or both. They include radio, tape, Public Address System (PAS). These devices make use of the sense of hearing only. Audio-visual instructional materials appeal to the sense of both hearing and seeing. They include television set, motion pictures, films, computers and DVD (Ifeakor, 2019). According to Okpa et al. (2021), it is very important for a teacher to put into consideration the age and ability of the learners, the lesson objectives, availability and accessibility of instructional

materials while selecting the instructional material to be used in teaching and learning processes.

According to Abubakar (2023), teaching is viewed as a deliberate effort to bring about positive transformations in a learner's behaviour, ultimately benefiting both the individual and the wider society. Effective teaching plays a crucial role in enhancing the learner's comprehension, improving their capabilities, and fostering more positive attitudes. It is characterized as a two-way process that facilitates the exchange of ideas between the teacher and the students. Effective teaching brings about effective learning. Learning refers to a change in human behaviour due to experience. It occurs only where there is relatively positive permanent change in behaviour that results from experience brought about by external factors, personal thinking or activity (e.g. direct instruction, incidental experiences, reading, discussion etc.). Simply put, learning is the process of acquiring knowledge, skills and attitudes. The proper utilization of instructional materials promotes effective teaching, enhances meaningful communication and encourages the interests of learners in teaching and learning process (Saleh et al. 2021).

The use of instructional materials greatly enhances the effectiveness of teaching and learning processes by making subject content more accessible and engaging. As noted by Saleh et al. (2021), the primary purpose of using these materials is to support instructional delivery. According to Iyede and Ootobo (2023), the achievement of learning objectives is closely linked to the availability and proper use of instructional resources. However, studies by Ekwevugbe and Atare (2022) have shown that instructional materials in many secondary schools are insufficient, posing challenges to effective teaching. This inadequacy has been associated with the persistent poor performance of students in Agricultural Science, particularly in the Senior School Certificate Examination (SSCE) (Iyede & Ootobo, 2023). Against this backdrop, the present study was undertaken to examine the availability and utilization of instructional materials for teaching Agricultural Science in secondary schools across the Rano Education Zone of Kano State.

Objectives of the Study

The study was guided by the following specific objectives:

- i. To evaluate the extent to which instructional materials are available for teaching and learning Agricultural Science in secondary schools within the Rano Education Zone.

- ii. To examine how frequently and effectively instructional materials are utilized in Agricultural Science instruction in secondary schools in the Rano Education Zone.
- iii. To identify the challenges hindering the effective use of instructional materials in Agricultural Science teaching and learning in the study area.
- iv. To explore potential strategies for addressing the challenges associated with the use of instructional materials in Agricultural Science instruction in secondary schools in Rano Education Zone.

Research Questions

The following research questions provided direction for the study:

- i. Are instructional materials for teaching and learning Agricultural Science readily available in secondary schools across the Rano Education Zone?
- ii. To what degree do Agricultural Science teachers in Rano Education Zone utilize instructional materials during instruction?
- iii. What are the key barriers to the effective use of instructional materials in Agricultural Science classes in secondary schools within the zone?
- iv. What measures can be taken to overcome the challenges affecting the use of instructional materials in the teaching and learning of Agricultural Science in the study area?

Methodology

This study adopted a descriptive survey research design and was guided by four research questions. The population comprised 93 Agricultural Science teachers from secondary schools within the Rano Education Zone of Kano State. Data were collected using a structured, researcher-developed questionnaire titled the Availability and Utilization of Instructional Materials for Teaching and Learning of Agricultural Science Questionnaire (AUIMTLAQ).

The instrument contained five sections: Section A gathered respondents' biodata, while Sections B to E addressed each of the four research questions, focusing respectively on the availability, utilization, challenges, and possible solutions related to instructional materials. The 35-item questionnaire used four-point rating scales tailored to each section: availability (HA–NA), utilization (VU–NU), and agreement (SA–SD). Respondents were instructed to select the option that best reflected their views.

The questionnaire was validated by three experts—two from the Department of Science and Technology Education at Bayero University, Kano, and one experienced Agricultural

Science teacher from the secondary school level. Their feedback informed the refinement of the final version of the instrument. To determine the reliability of the questionnaire, a pilot test was conducted in six schools outside the main study area but with similar characteristics. Using Cronbach's Alpha, a reliability coefficient of 0.87 was obtained, indicating high reliability. The "wait-and-take" method was used to administer and retrieve the questionnaire immediately after completion, ensuring a 100% return rate. Data were analyzed using mean and standard deviation. For interpretation, a mean score of 2.50 and above indicated availability (RQ1), usage (RQ2), or agreement (RQ3 and RQ4), while scores below 2.50 reflected non-availability, non-usage, or disagreement respectively.

Results

Research Question One: Are instructional materials for teaching and learning Agricultural Science readily available in secondary schools across the Rano Education Zone?

Table 1: Mean Ratings of Respondents on the Availability of Instructional Materials for Teaching and Learning of Agricultural Science in Secondary Schools in Rano Education Zone (N = 93).

S/N	Responses	Mean	Standard Deviation	Decision
1	Agricultural science laboratory	3.46	0.89	Available
2	Laboratory facilities such as soil samples, specimens of agricultural produce, insect pests, endo and ectoparasites, weeds, PH meter and sample of rocks	2.05	1.23	Not available
3	Agricultural science textbooks	2.99	1.33	Available
4	School farm	3.00	0.54	Available
5	School livestock	3.19	0.98	Available
6	Samples of animal feeds	2.96	1.12	Available
7	Samples of varieties of seeds	2.75	1.40	Available
8	Simple farm tools such as, cutlass, , garden fork, hand trowel, head pan, axes, wheelbarrow and hoe	3.35	1.33	Available
9	Chemical fertilizer	2.73	0.71	Available

10	Survey facilities such as ranging pole, measuring tape, prismatic compass, and gunter chain	1.07	1.32	Not available
11	Agricultural charts and pictures	3.11	1.51	Available
12	Tractor	1.34	0.99	Not available
13	Tractors implement such as harrows, ploughs, ridger and planters	1.01	0.77	Not available
14	Television sets	2.00	0.68	Not available
15	Computers	3.10	1.42	Available
16	Overhead projector	2.10	1.23	Not available

Table 1 shows the availability of instructional materials for teaching and learning agricultural science in secondary schools in Rano Education Zone. The results revealed that 10 out of 16 (62.5%) of the instructional materials presented before the respondents were available in the study area for teaching and learning of agricultural science. This is because their mean values were greater than 2.50. The findings also revealed that 6 out of 16 (37.5%) of the instructional materials were not available in the study area, as their mean values were less than 2.50. The 16 items had standard deviation ranged from 0.54 to 1.51. This indicated that the respondents were not very distant in their opinions.

Research Question two: To what degree do Agricultural Science teachers in Rano Education Zone utilize instructional materials during instruction?

Table 2: Mean Ratings of Respondents on the extent of use of Instructional Materials for Teaching and Learning of Agricultural Science in Secondary Schools in Rano Education Zone (N = 93)

S/N	Responses	Mean	Standard Deviation	Decision
1	Agricultural science laboratory	2.76	0.87	Used
2	Laboratory facilities such as soil samples, specimens of agricultural produce, insect pests, endo and ectoparasites, weeds, PH meter and sample of rocks	2.01	0.67	Not Used

3	Agricultural science textbooks	2.95	0.78	Used
4	School farm	2.99	0.77	Used
5	School livestock	2.94	0.99	Used
6	Samples of animal feeds	3.00	0.74	Used
7	Samples of varieties of seeds	2.98		Used
8	Simple farm tools such as, cutlass, garden fork, hand trowel, head pan, axes, wheelbarrow and hoe	3.26	0.90	Used
9	Chemical fertilizer	3.10	1.02	Used
10	Survey facilities such as ranging pole, measuring tape, prismatic compass, and gunter chain	1.04	0.93	Not Used
11	Agricultural charts and pictures	3.76	1.32	Used
12	Tractor	1.01	1.07	Not Used
13	Tractors implement such as harrows, ploughs, ridger and planters	1.05	0.76	Not Used
14	Television sets	2.23	0.79	Not Used
15	Computers	2.65	0.79	Used
16	Overhead projector	1.02	1.22	Not Used

Table 2 shows the extent of use of instructional materials for teaching and learning of agricultural science in secondary schools in Rano Education Zone. The results indicated that 10 out of 16 (62.5%) instructional materials presented before the respondents were used in teaching and learning of agricultural science in the study area. This is because their mean values are greater than 2.50. The finding also revealed that 6 out of 16 (37.5%) of the instructional materials were not used in the study area as their mean values were less than 2.50. The standard deviation for the items ranging from 0.67 to 1.32 indicated that the respondents were closed to each other in their opinions.

Research Question three: What are the key barriers to the effective use of instructional materials in Agricultural Science classes in secondary schools within the zone?

Table 3. Mean Ratings of Respondents on the Factors Militating Against the Use of Instructional Materials for Teaching and Learning of Agricultural Science in Secondary Schools in Rano Education Zone (N = 93).

S/N	Responses	Mean	Standard Deviation	Decision
1	Inadequate technical skills on the part of Agricultural science teachers for using instructional resources in teaching processes	2.89	0.78	Agreed
2	Inadequate motivation for Agricultural science teachers.	2.78	0.79	Agreed
3	Inadequate of modern agricultural science teaching and learning materials in secondary schools	3.05	0.68	Agreed
4	Lack of adequate ICT facilities for teaching and learning processes in secondary schools	2.99	0.93	Agreed
5	Inadequate and ineffective monitoring and evaluation of Agricultural science teachers by the secondary school authority.	3.26	0.99	Agreed
6	Lack of well-equipped school farm for practical activities	3.01	0.85	Agreed
7	Lack of well-equipped agricultural science laboratory	3.00	1.06	Agreed
8	Lack of agricultural science resource centre for the Agricultural students to conduct research	2.99	0.86	Agreed
9	Inadequate fund for purchasing of agricultural science teaching and learning materials	3.52	0.88	Agreed

Table 3 shows factors affecting the use of instructional materials for teaching and learning of agricultural science in secondary schools in Rano Education Zone. The results showed that all the nine factors presented before the respondents were agreed as the factors militating against the use of instructional materials for teaching and learning of agricultural science in secondary schools in the study area. This is because their mean values were greater than 2.50. The standard deviation for the items which ranged from 0.68 to 1.06 indicated that the respondents were closed to one another in their opinions.

Research Question four: What measures can be taken to overcome the challenges affecting the use of instructional materials in the teaching and learning of Agricultural Science in the study area?

Table 4. Mean Ratings of Respondents on Possible Solutions to the Problems Militating against the Use of Instructional Materials for Teaching and Learning of Agricultural Science in Secondary Schools in Rano Education Zone (N = 93).

S/N	Responses	Mean	Standard Deviation	Decision
1	Well trained and adequate teachers for Agriculture should be provided by Ministry of Education and posted them to the various secondary schools.	2.76	0.76	Agreed
2	The secondary schools are to be using low-cost teaching and learning materials	2.88	0.69	Agreed
3	Parents should cooperate with teachers in the provision and use of improvisation of visual instructional materials	2.90	1.02	Agreed
4	Communities where public schools are cited, should assist in providing adequate instructional materials for the schools	3.32	0.98	Agreed
5	The schools' authority should encourage teachers to integrating ICT in their teaching processes	3.22	1.01	Agreed
6	Secondary schools' authority should ensure effective monitoring and evaluation of Agricultural science teachers on their duties	2.99	1.00	Agreed
7	Parents Teachers association should provide land specifically for practical in Agriculture	3.01	1.03	Agreed
8	Adequate funds should be made available by the secondary school's authorities for provision of agricultural science laboratory in their schools	3.33	0.97	Agreed

9	Non-Governmental Organizations (NGOs) should provide adequate funds for resource center to enable students conduct practical and research	2.67	0.74	Agreed
10	Kano State Ministry of Education and community should provide funds specifically meant for teaching practical Agriculture in secondary schools	3.24	0.95	Agreed

Table 4 shows the possible solutions to the problems militating against the use of instructional materials for teaching and learning of agricultural science in secondary schools in Rano Education Zone. The result revealed that all the nine factors presented before the respondents were agreed as the possible solutions to the problems militating against the use of instructional materials for teaching and learning of agricultural science in secondary schools in the study area. This is because their mean values were greater than 2.50. The standard deviation for the items ranging from 0.69 to 1.03 indicated that the respondents were not distant from each other in their opinions.

Discussion of Findings

The results of the study showed that agricultural science laboratory, agricultural science textbooks, school farm, school livestock, samples of animal feeds, samples of varieties of seeds, simple farm tools, agricultural charts, pictures and computers were available in the study area for teaching and learning of agricultural science. These findings are in line with the findings of Okpa et al. (2021) who found that multimedia computer were available; Ekwevugbe and Atare (2022) who discovered that textbooks and computers were available and Abubakar (2023) who revealed that visual aids were available for teaching and learning agricultural science in secondary school in their respective study areas. However not in line with Abubakar (2023) who revealed that agricultural science laboratory was not available in the secondary schools he studied. The finding also shows that laboratory facilities such as soil samples, specimens of agricultural produce, insect pests, endo and ectoparasites, weeds, Ph meter and sample of rocks, survey facilities, tractors implement, television sets and overhead projector were not available in the study area for teaching and learning of agricultural science. These findings are in line with findings of Ekwevugbe and Atare (2022) who discovered that tape recorder and overhead projector were not available and Soetan et al. (2012) who revealed that

farm machines and equipment and multi-media projector were not available in the secondary schools they conducted their studies. The finding is was not in line with that of Chukwueke and Oluwabunmi (2022) who revealed that Television sets were available in the secondary schools he conducted his research.

With regards to the use of the instructional materials in secondary schools, it was discovered that agricultural science laboratory, agricultural science textbooks, school farm, school livestock, samples of animal feeds, samples of varieties of seeds, simple farm tools, chemical fertilizer, agricultural charts, pictures and computers were used in teaching and learning of agricultural science in the study area. These findings are in line with the findings of Ifeyinwa and Obiora (2020) who indicated that simple farm tools and textbooks were utilized; Soetan et al. (2021) who revealed that textbooks, farm tools, agricultural science laboratory, charts and pictures were used; Ekwevugbe and Atare (2022); Chukwueke and Oluwabunmi (2022) who discovered that textbooks and computers were utilized and Makinde and Pitan (2024) who found that simple farm tools, agricultural textbooks and agricultural charts were used for teaching and learning agricultural science in secondary school in their respective study areas. The finding also shows that laboratory facilities, survey facilities, tractors implement, television sets and overhead projector were not used in the study area for teaching and learning of agricultural science. These findings are in line with findings of Soetan et al. (2012) who revealed that farm machines and equipment in the school were not utilized; Ekwevugbe and Atare (2022) who discovered that tape recorder and overhead projector were not used and Makinde and Pitan (2024) who found that farm machines and equipment were not used. However, the findings are not in line with other finding of the Makinde and Pitan (2024) who pointed out that school farm and Agricultural laboratory were not used in teaching and learning agricultural science in the secondary schools he conducted his study.

The results of the study showed that the problems militating against the use of instructional materials for teaching and learning of agricultural science in secondary schools in the study area were inadequate technical skills on the part of agricultural science teachers for using instructional resources, inadequate motivation for agricultural science teachers, inadequate of modern agricultural science teaching and learning materials, lack of adequate ICT facilities, inadequate and ineffective monitoring and evaluation of agricultural science teachers, lack of well-equipped school farm for practical activities, lack of well-equipped agricultural science laboratory, lack of agricultural science resource centre and inadequate fund for purchasing of agricultural science teaching and learning materials. This finding is consistent

with previous studies conducted by Soetan et al. (2021) who found out inadequate fund for purchasing instructional resources; Abubakar (2023) who discovered the absence of farm tools and facilities in schools; Iyede and Otobo (2023) who revealed the personality of the teachers' characteristics and non-availability of instructional material; Makama et al. (2025) who pointed out lack of adequate ICT facilities in schools as the problems militating against the use of instructional materials for teaching and learning of agricultural science in secondary schools. The results of the study showed that the possible solutions the problems militating against the use of instructional materials for teaching and learning of agricultural science in secondary schools in the study area were provision of well trained and adequate teachers, using low-cost teaching and learning materials, provision of adequate instructional materials, improvisation of visual instructional materials, effective monitoring and evaluation, provision of land for practical, integrating ICT in teaching processes and provision of adequate funds by the community, Non-Governmental Organizations (NGOs) and Kano State Ministry of Education specifically meant for teaching practical Agriculture in secondary schools. These findings are in agreement with the findings of Soetan et al. (2021) who revealed that teachers should be encouraged to make appropriate use of available resources to teach and learn effectively; Abubakar (2023) who pointed out that adequate funds should be made available by the government; Iyede and Otobo, (2023) who reported that Schools and the government should both provide enough instructional materials and Makinde and Pitan (2024) who had the opinions that the concerned government should increase allocation of funds to facilitate the provision of essential school resources for the effective teaching and learning of agriculture.

Conclusion

Based on the findings of the study it was concluded that agricultural science instructional materials were available and also used in teaching and learning of agricultural science in secondary schools in the study area. However, laboratory facilities, survey facilities, tractors and tractors implement were not available therefore not used. This hinders students' practical activities, as agricultural science is a practical oriented subject, the attainment of programme's objectives in secondary schools is therefore limited leading to majority of secondary schools' students graduated without acquiring productive skills that will make them self-employed.

Recommendations

The following recommendations were offered based on the results of the study;

- i. Kano State Ministry of Education should provide adequate in-service, seminar and workshop training opportunities for agricultural science teachers to enable them acquire technical skills for u modern instructional resources in teaching and learning processes.
- ii. Kano State Secondary Schools Management Board should ensure regular and effective monitoring and evaluation of Agricultural science teachers in order to improve their work efficiency.
- iii. Parents Teachers Association should provide modern agricultural science teaching and learning materials in secondary schools
- iv. Non-Governmental Organizations and Kano State Government should provide funds for purchasing agricultural science instructional materials and equipping for agricultural science laboratory.

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